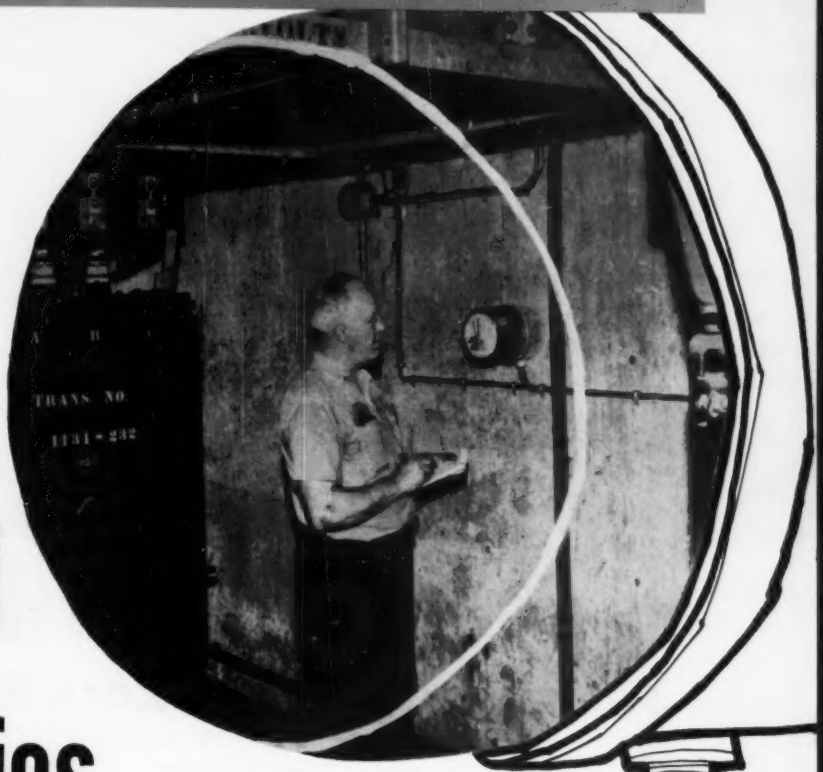
The Electrical Industry's Weekly Magazine

February 3, 1958

Electrical World

Price 50 Cents

A McGraw-Hill Publication



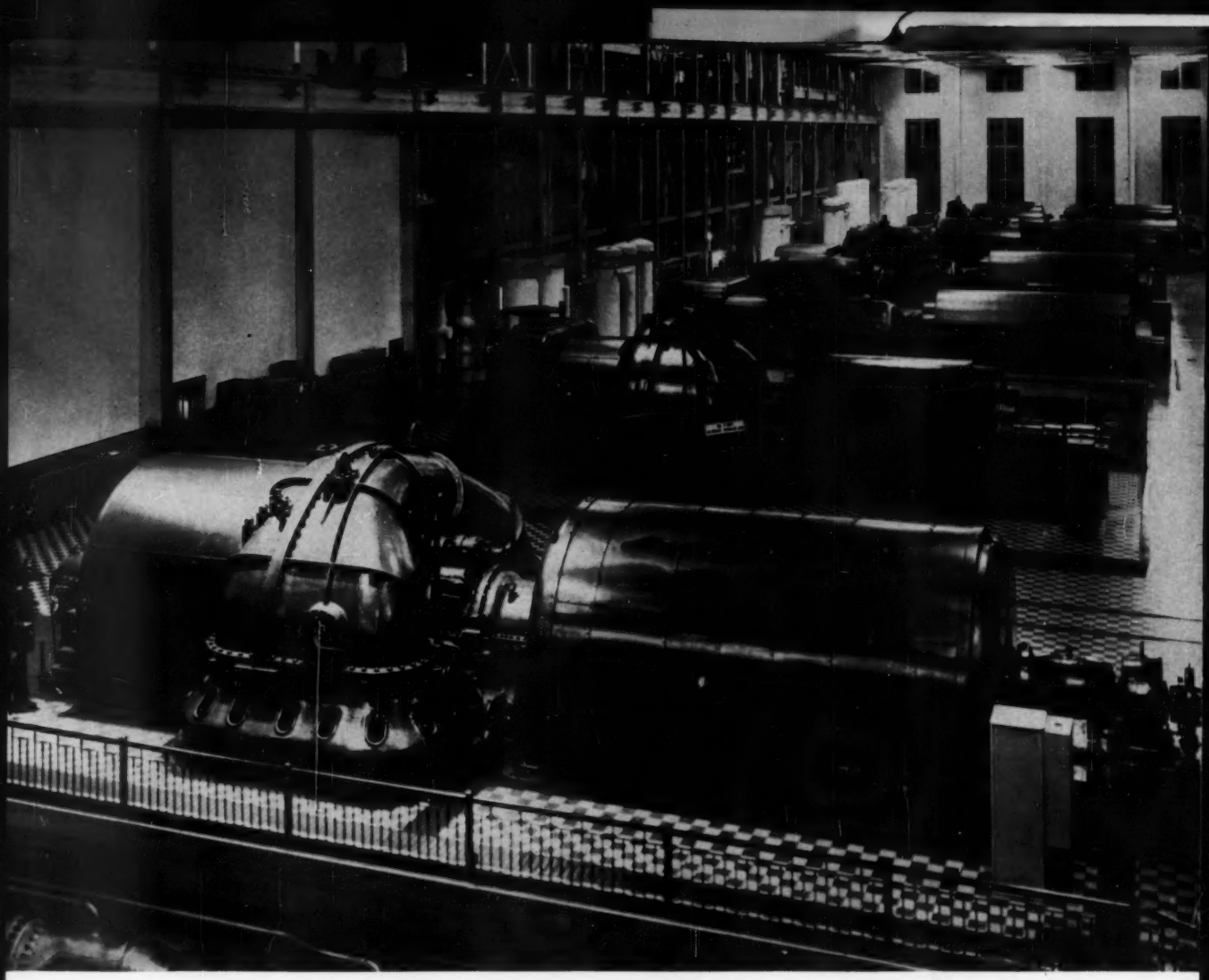
New Method Simplifies Network Load Tests

Page 70

Tomorrow's Power Source? . . . p 56

Semi-Annual Index . . . p 121

E B POWER GS
UNIVERSITY MICROFILMS I
313 N 1 ST
ANN ARBOR MICH



How does your present turbine lubricant stack up against Texaco Regal Oil R&O?

Does it offer the major advantages of Texaco Regal Oil R&O?

No rust, sludge or foam in the turbine system.

A longer service life that provides real lubricant economy.

Ever-normal bearing temperatures, even under demand loads.

Instantaneous governor response to protect equipment.

Texaco Regal Oils R&O are designed to assure these benefits—and many others. There is a complete line of Texaco Regal Oils R&O for every type and size of turbine—designed to meet the exacting requirements of all turbine manufacturers.

A Texaco representative will help you select the oil that provides your turbines with all advantages. Simply call the nearest of the more than 2,000 Texaco Distributing Plants, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN... Metropolitan Opera Radio Broadcasts Every Saturday Afternoon

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

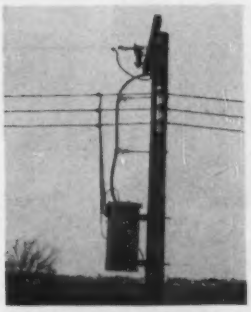
(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

Electrical World

Vol. 149, No. 5 FEBRUARY 3, 1958

Published for 84 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue



DISTRIBUTION

Transformer Pole Designed for Added Safety

H. N. Diller, Central Ill. Public Service Co

New economical design uses flexible polyethylene tubing to train primaries from cutout to bushing.....p 74

METERING

How to Improve Your Network Load Metering

J. P. Galassini, H. Pensky, Commonwealth Edison Co

Scheme developed for measuring loads in downtown network vaults has five advantages over old way.....p 70

SELLING

3-Year Electric Heating Drive Pays Off

Indianapolis P&L campaign reaches home builders, manufacturers, trade allies. To continue in 1958.....p 62

SUBSTATIONS

Landscaped Substations Win Suburban Nod

George Metz, Consolidated Edison Co

Trees, shrubbery, lawns are used to blend unit station sites into residential surroundings in New York area.....p 64

SYSTEM ENGINEERING

Load Control System Proves Out

First installation of new load-frequency scheme is successful in initial operation at Niagara Mohawk.....p 72

Departments

Atomic Progress 56
Editorials 55
• Electrical Newsletter 19
Executive Reader 22
From the Publisher 5
Heating & Cooling..... 86
How To 75
• Management Newsletter ...107
Manufacturers and Markets.113
Meetings Calendar 106
New Equipment 92
News About People 115
News-Beat 67
Readers Forum 120
Selling 84
• Semi-Annual Index 121
Washington Wire 59
INDEX TO ADVERTISERS...120

12kv giant goes under. San Diego Gas & Electric installed this 3,900-foot submarine cable across San Diego Bay in a fast and trouble-free operation. The new 12kv, 3/c, 500,000 CM cable is 4½ inches in diameter with Okolite rubber insulation, copper shielding tapes and steel armor.

Cable laying time: **half an hour flat!**

Okolite used for pre-tested dependability

The problem was to obtain maximum dependability in the new submarine cable laid under San Diego Bay to handle increased power needs in the busy Coronado area. In submarine cable, of course, dependability is doubly important with the rough service cable gets and the complicated and expensive operation required to lay a cable or remove it in case of trouble.

To insure this dependability, engineers from San Diego Gas and Electric chose pre-tested Okolite-insulated cable . . . and took advantage of three sound standards for evaluating anticipated cable service:

1. Time—High-voltage Okolite-insulated cables have a service record of more than 30 years . . . on land as well as in tough, underwater services, where a case of trouble can run into thousands of dollars.

2. Engineering—Okonite engineers' know-how pays off in every stage of cable purchase and installation: from designing the best construction possible to speeding installation, as in San Diego's case, with Okonite-designed reel frames, lifting beams and other cable-handling equipment.

3. Inch-by-Inch Inspection—Okonite now provides built-in life insurance for every strip-insulated, high-voltage cable through the use of its exclusive development, the "Gooding Test Train." This electronic testing equipment, which scans every inch of the cable, can pick out the most minute imperfection—impossible to detect by any standard test method—that might shorten cable life after it's placed in service.

These are three good reasons for *you* to specify Okolite for *your* vital high-voltage circuits. Whatever your cable needs, when you talk to Okonite, you get unprejudiced recommendations because Okonite, and *only* Okonite, makes cable by all four insulating methods: strip . . . dip . . . extrusion . . . taping. The Okonite Company, Passaic, New Jersey.

where there's electrical power . . . there's **OKONITE CABLE**

5479

Perforated Pages Bring Praise and Worry

To all of you who have written us about our new perforated pages, we are most grateful. There have been letters of praise and letters expressing concern. Typical letters will appear in our Readers Forum column.

Concern is expressed by librarians who fear the perforations will cause trouble in binding issues into permanent volumes. We went right to work investigating this potential trouble. We can now report:

1. At least two of our sister magazines have carried perforated pages for a full year and have had no binding problems. Our company library confirms this.

2. We have made a special bound volume of perforated issues with very good results. The book binder had no trouble preparing it and he feels the bound copies will stand up well under normal treatment.

3. As is the case with our previous bound volumes, the trial binding was "oven-sewn" rather than "smyth-sewn". We should be glad to supply the name of our binder if that would be of any help.

The perforated pages are intended as an additional service to our readers. If after consulting with your bindery, you still anticipate problems with the perforated pages, I would very much appreciate hearing from you.

Fischer Black

Electrical World Staff

Fischer Black Publisher and Editor
Daniel T Braymer Assistant to the Editor

Engineering

Leonard M Olmsted Managing Technical Editor
John J Kearney Assistant Managing Technical Editor
Howard S Knowlton New England Editor, Boston
Edward Allen Midwestern Editor, Chicago
Francis J Kovalcik Middle Eastern Editor
David Rea Southeastern Editor, Atlanta
James G Plunkett Northeastern Editor
Charles F Hochgesang Western Editor, San Francisco
Archer E Knowlton Consulting Editor

News

Herbert R Frankel Managing News Editor
Rue M Sheop Associate Editor
Allen Long News Editor **Michael G Duerr, Theodore Fuller** and **Denise McCarthy** Assistants
Thomas R Jordan Commercial Editor
Kenneth N McLean Industrial Editor
George B Bryant, Jr Manager, Washington Bureau

Special Services

Arthur J Stegeman Manager, Market Research
Dexter M Keezer Director, Economics Department
E Russell Eggers Economist

Production

Jesse A Mock Manager of Production
George Swift Assistant Manager of Production
Frank C Stockman Art Director
H Tomlinson Howland, Jr Associate Art Director
Elinor Gulla Assistant Production Editor

Advertising

Warren W Shew Sales Manager
District Managers: N V Palmer, E S Chapin and D J Roberts, New York; E S Chapin, Boston; F P Coyle, Philadelphia; M S Kearney, Cleveland; M I O'Connell, Detroit; W H Meneilley and J T Schaefer, Chicago; J T Schaefer, St. Louis; Russell Antles, Los Angeles; R C Alcorn and T H Carmody, San Francisco; Robert H Powell, Atlanta; Gordon Jones, Dallas.
Otto A Drechsel Business Manager
Donald K Ellis Promotion Manager

E Bryson Sessions Circulation Manager

ABP ELECTRICAL WORLD

Published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. **Executive, Editorial, Circulation, and Advertising Offices:** McGraw-Hill Building, 330 West 42nd Street, New York 36, N.Y. Printed at 99-129 North Broadway, Albany 1, N. Y. See panel at right for circulation regarding subscriptions or change of address.

Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice President; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venesian, Vice-President and Circulation Coordinator.

Subscriptions are solicited from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields; and from consulting engineers and electrical engineers in industry. **Position and company connection must be indicated on subscription orders.** Send to address shown in box at right.

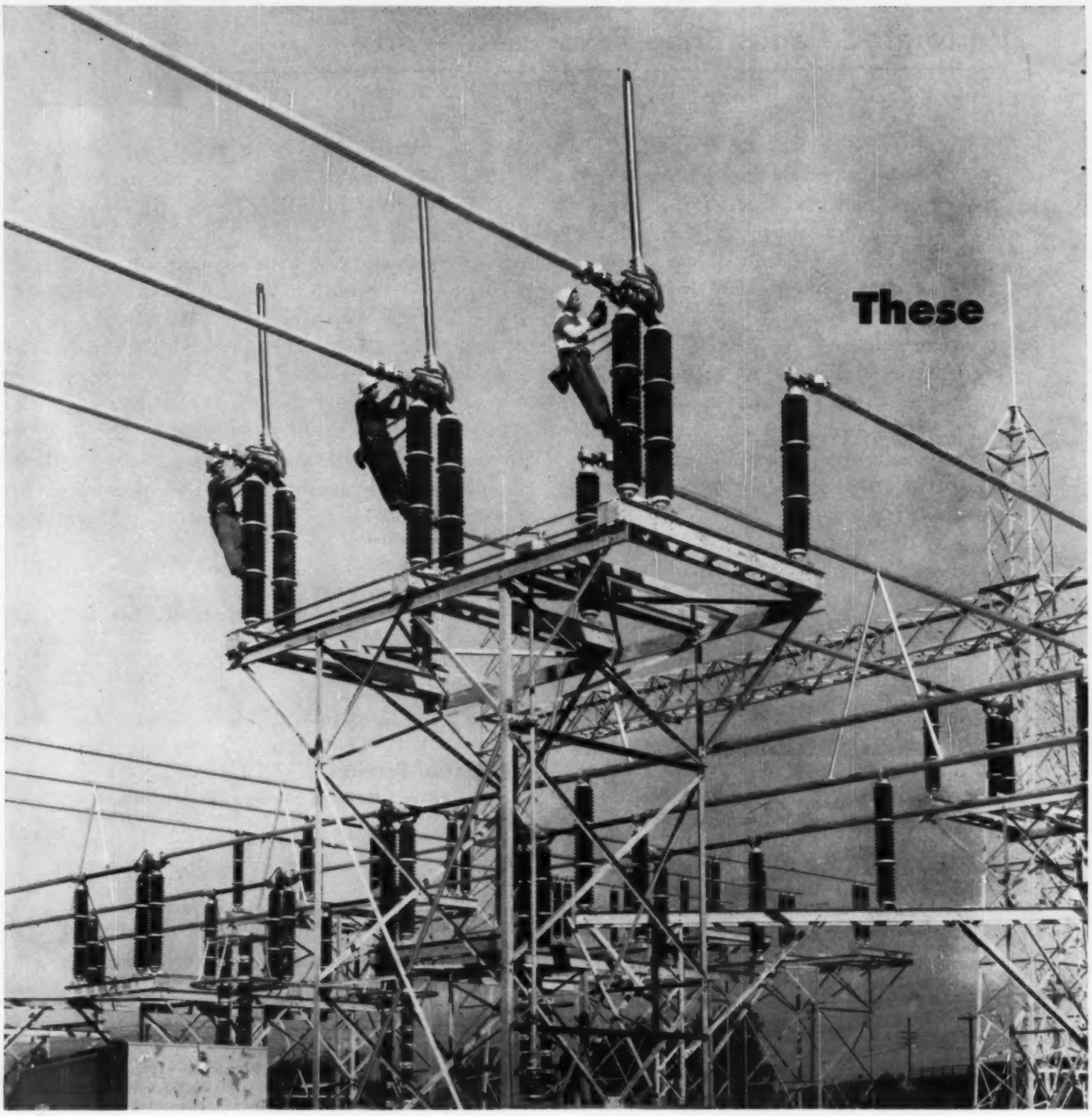
United States and Canada subscription rate for individuals in the field of the publication $6.00 per year; single copies 50 cents. Other Western Hemisphere and the Philippines $20.00 payable in advance and other countries $30.00 payable in advance.

Second-class mail privileges authorized at Albany, N. Y. Printed in U.S.A. Title registered in U. S. Patent Office.

© Copyright 1958 McGraw-Hill Publishing Company, Inc. All rights reserved. Permission required to reproduce any of contents.

SUBSCRIPTIONS AND ADDRESS CHANGES: Send subscription correspondence and change of address to Subscription Manager, ELECTRICAL WORLD, 330 West 42nd Street, New York 36, N. Y. Subscribers should notify Subscription Manager promptly of any change of address, giving old as well as new address, and including postal zone number, if any. If possible, enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

Postmaster . . . Please send form 3579 to Electrical World, 330 W. 42nd St., New York 36, N. Y.

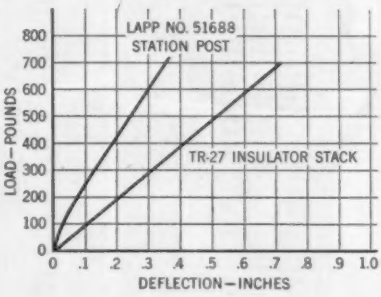


Part of 230 kv bus at Niagara Mohawk Power Corporation's Gardenville substation, planned for 600,000 kva ultimate capacity. Energized October, 1957. Insulators are Lapp High Strength Station Posts, No. 51688, 900 BIL.

230 kv switches will stay lined up

they're on Lapp Station Posts

Even if there weren't a dozen other good reasons, Lapp Station Posts could merit specification for high-voltage switch use on their superiority in *stiffness* alone. Fact is that, at all cantilever loadings, deflection of 230 kv Lapp Station Post is approximately 50% that of corresponding conventional pin-cap stacks (as indicated by deflection curve at right from laboratory deflection measurements). This is easily understood when you consider the differences in these designs . . . the Lapp Station Post unit is a one-piece porcelain post with caps cemented at the ends in large-area, low-intensity compression grip . . . compared to the nested porcelain shells, internal pins, and high intensity tension-loading of stacking units. No wonder switches on Lapp Station Posts line up better under all loads . . . and operate better in all kinds of weather . . . throughout their life!



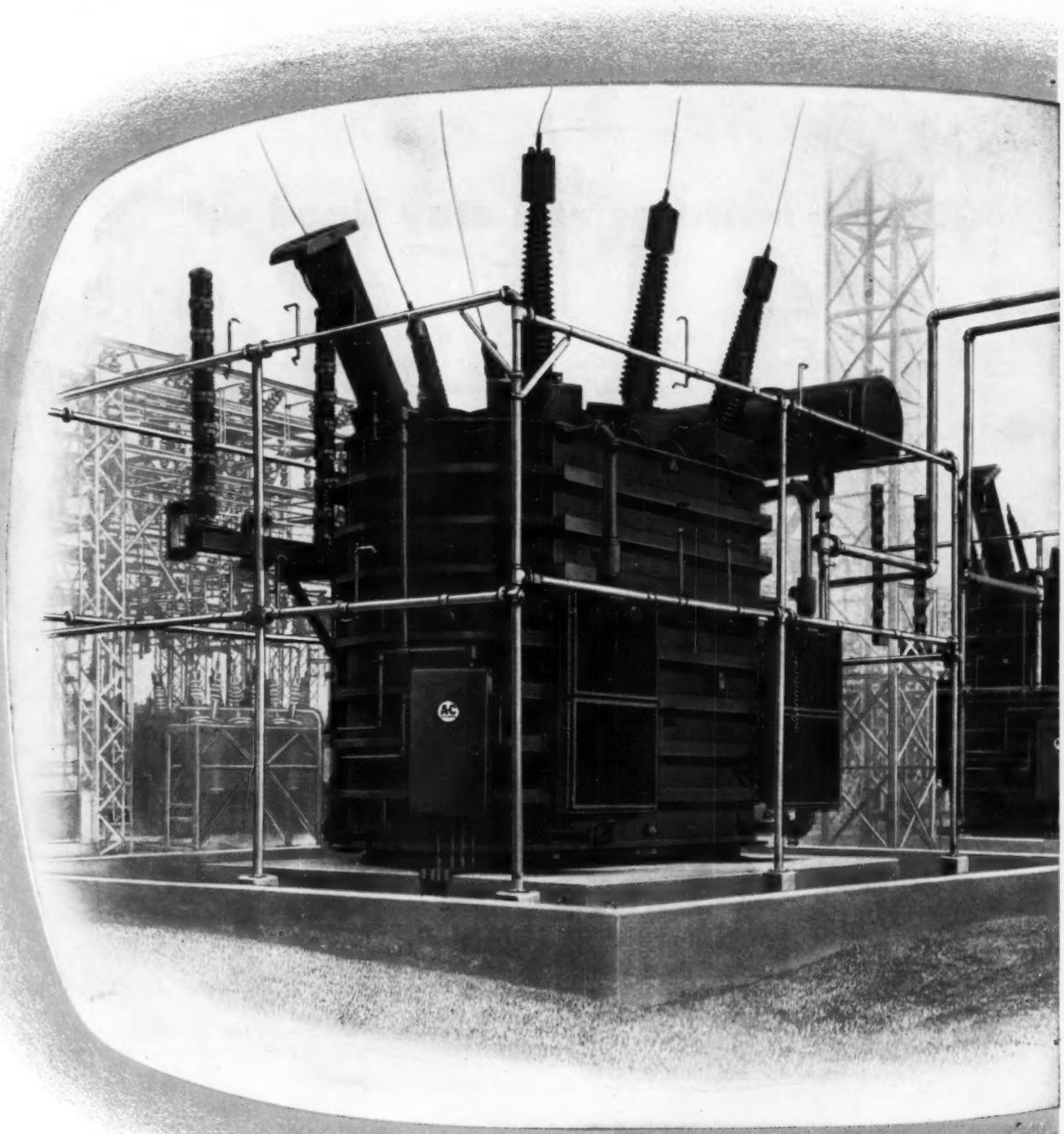
They go up easier, faster, too . . . assembled and installed with 16 bolts, as compared with 24 bolts required by a conventional 230 kv switch insulator. Weigh 30% less, too. Lapp Station Posts for 230 kv are available in two BIL ratings (900 kv withstand and 1050 kv withstand) and in three strength ratings . . . including new extra-high-strength that possesses cantilever values greater than those of any switch and bus insulators ever offered before at this voltage.

Look into the merits of Lapp Station Posts for your new construction at 230 kv (also at every other voltage from 7.5 kv to 385 kv . . . or higher). It will pay off in improved operating records, lower maintenance cost and longer life of your equipment.

Lapp Insulator Co., Inc., Le Roy, N. Y.

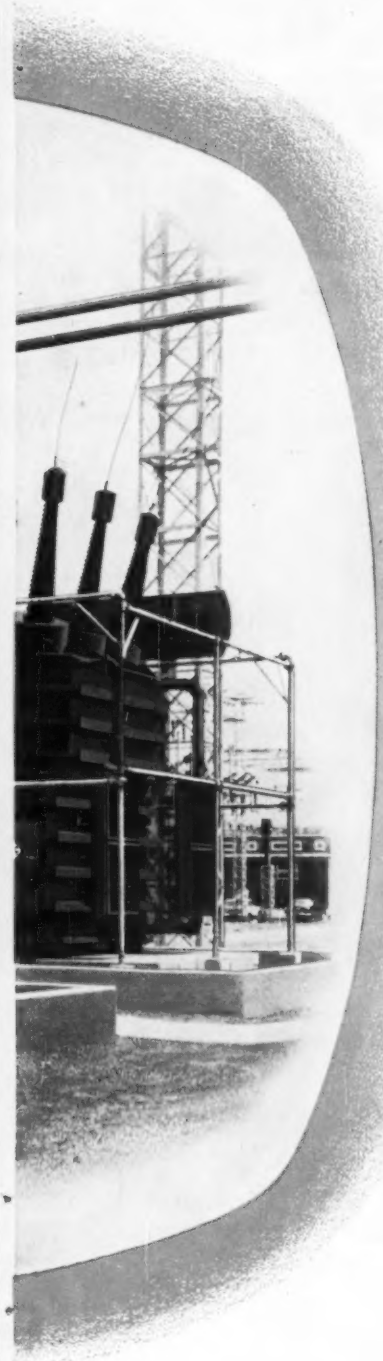
Lapp

Another example of Allis-Chalmers



A-5566

leadership in transformers



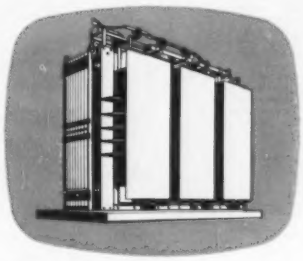
Two 150,000-kva Autotransformers for Duke Power Co. tie 115-kv and new 230-kv lines

The use of autotransformers in the size range of the 150,000-kva units shown here allows new savings possibilities. That's why today's trend toward autotransformers is receiving increased attention.

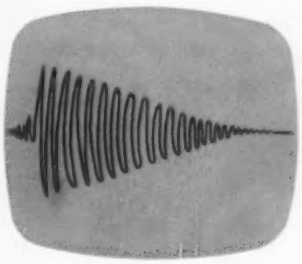
For example, it is estimated that these units cost about 40% less than conventional transformers. In addition, they are smaller, more efficient and have lower impedance.

Allis-Chalmers autotransformers are available in single or three-phase types with or without load tap changing, in all kva and voltage sizes for: interconnection of systems, phase shifting, or generating station step-up service.

For details call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

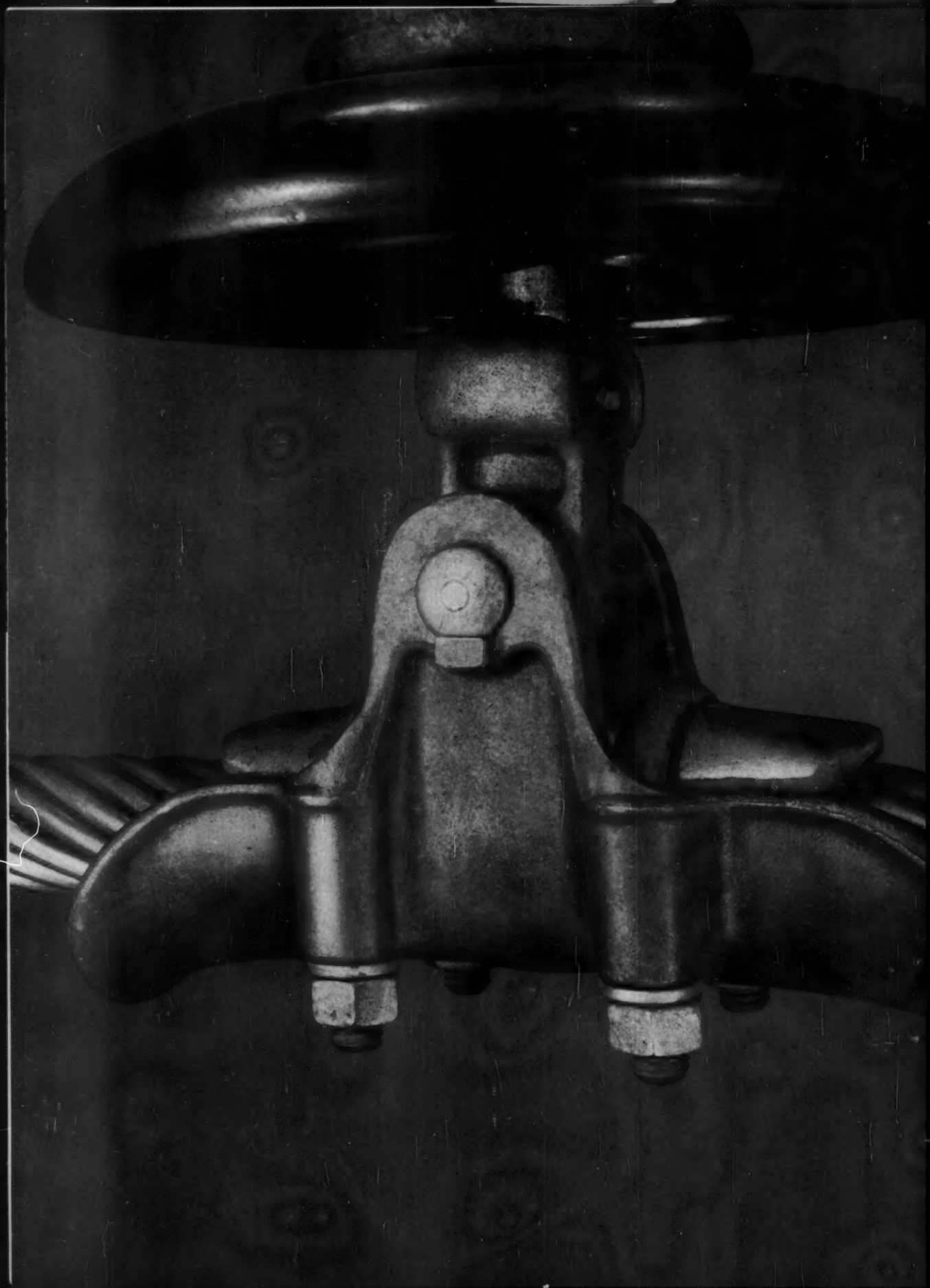


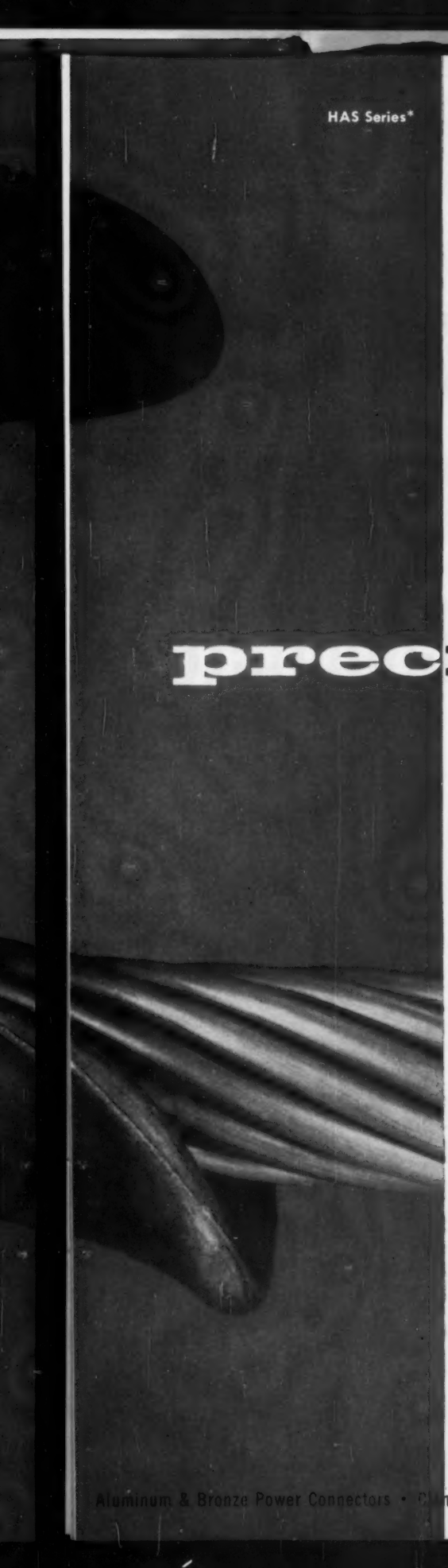
Circular coil, shell form construction used in these transformers is inherently strong, provides high impulse strength, good impulse voltage distribution.



New switching surge test plus standard impulse test subjects transformer to overvoltage surge conditions found in actual operation.

ALLIS-CHALMERS





precision...

Power loss is practically eliminated with Anderson's Suspension Clamps. They are precision engineered to permit dual use . . . suspension as well as angle pull off. Specific features were engineered to allow widest range of conductor sags. Light weight construction reduces conductor damage.

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama

ANDERSON ELECTRIC

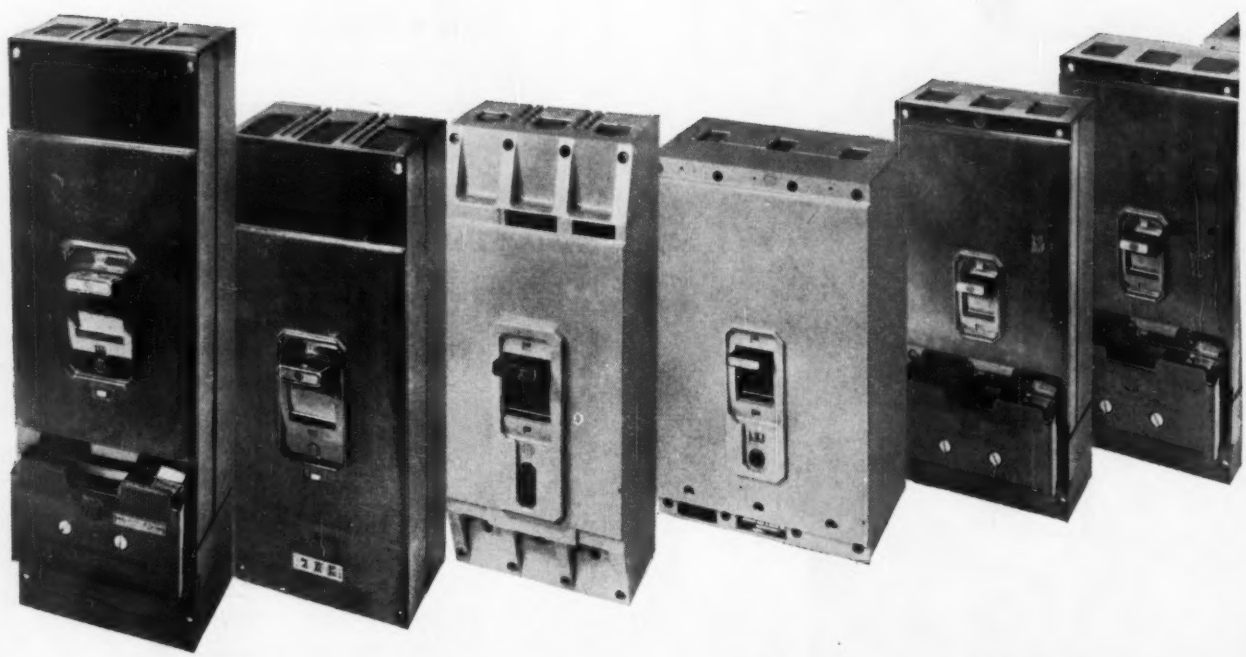
Sold through Insulator Manufacturers.
Export Agent: International Standard Electric Corp.

Aluminum & Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATIONS • TRANSMISSION • DISTRIBUTION

MOLDED CASE CIRCUIT BREAKERS

YOU GET "EXTRA QUALITY —AT NO EXTRA COST"

in Industry's Most Complete and Diversified Line

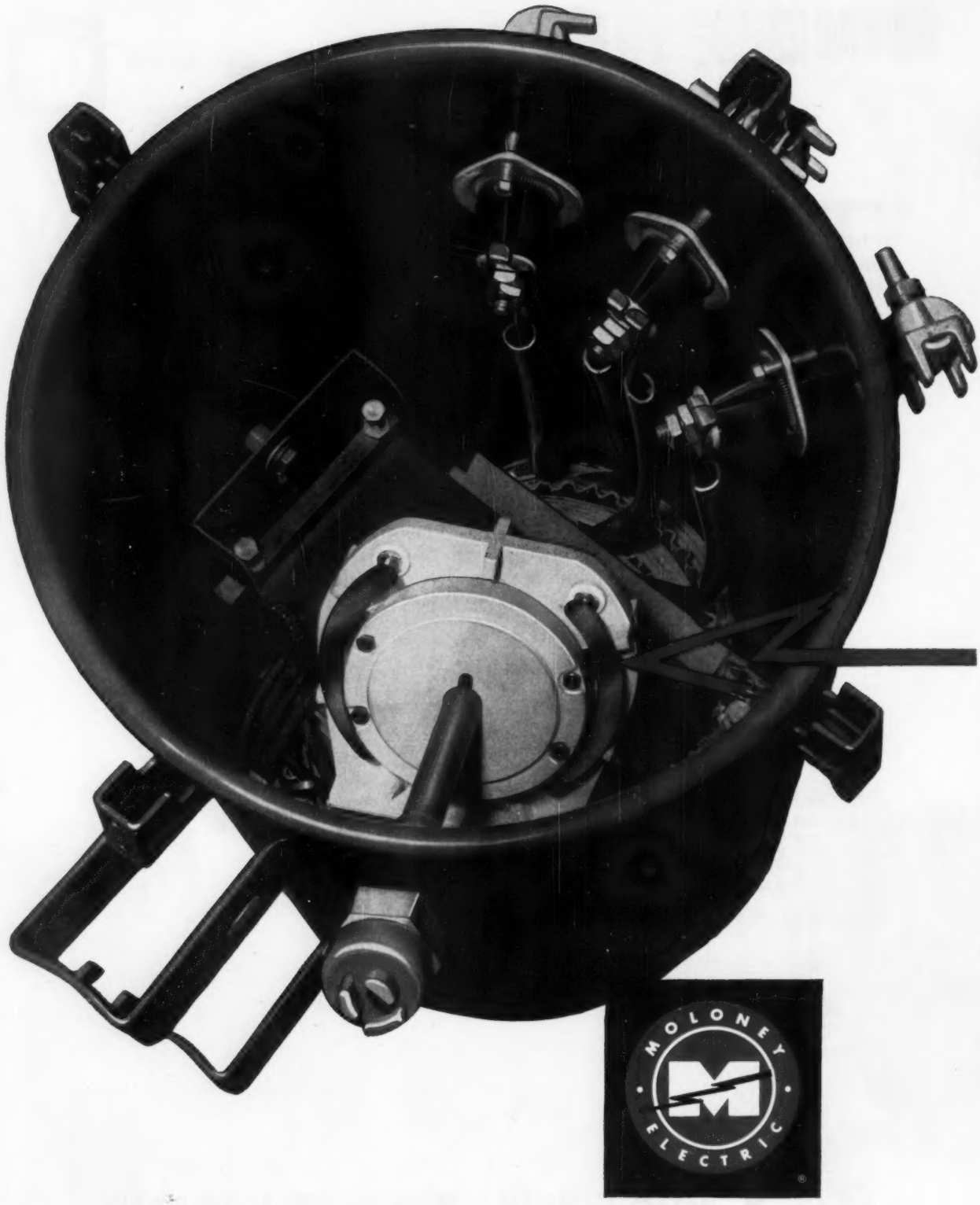


From the smallest circuit breakers for lighting circuit protection, through I-T-E's exclusive Cordons—with 100,000 amp interrupting capacities—to the many special-purpose breakers, such as the 400 cycle, 1000 v selective trip breaker designed for Navy use, I-T-E molded case circuit breakers constitute industry's most complete line.

Not only is the I-T-E line the most complete and most diversified, but I-T-E's famed "extra quality—at no extra cost" is built into every product which bears the I-T-E label. And you can depend on the nation-wide network of I-T-E distributors and field engineers to give you second-to-none service. I-T-E Circuit Breaker Co., Small Air Circuit Breaker Division, 19th and Hamilton Streets, Philadelphia 30.

I-T-E CIRCUIT BREAKER COMPANY

PHILADELPHIA, PENNSYLVANIA


MOLONEY
ELECTRIC

INTRODUCING...

MOLONEY S-M (Series-Multiple) DISTRIBUTION TRANSFORMERS

Many utilities having in mind future load growth which will necessitate the use of higher distribution system voltage, are installing transformers having series-multiple high voltage windings. These transformers are initially used on the multiple connection and later changed to the series connection when the distribution voltage is raised.

The use of series-multiple transformers eliminates the need for changing out transformers and thereby reduces cutover time. To further reduce cutover time Moloney is offering transformers equipped with an *externally operable* series-multiple switch making it unnecessary to open the tank and change terminal board links.

MOLONEY S-M

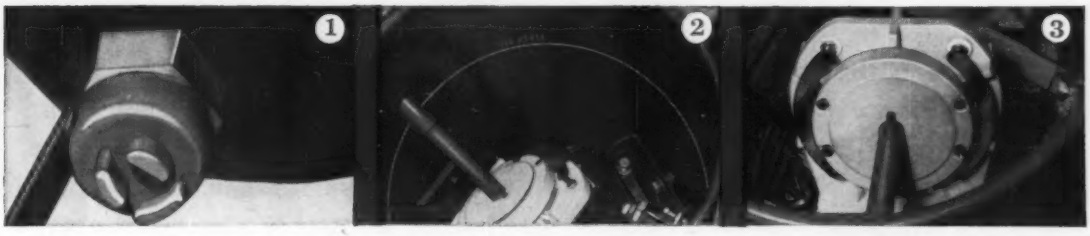
Distribution Transformers equipped with this series-multiple switch are available in standard sizes from 5 to 167 KVA and with any of the following high voltage ratings: 2400/4160Y x 4800/8320Y, 2400/4160Y x 7200/12470Y, 4800/8320Y x 14400/24940 Grd. Y., 7200/12470Y x 14400/24940 Grd. Y.

1. Operation of the switch is extremely simple, it is only necessary to unscrew the cap, turn the cap over, insert it on the operating shaft and rotate the switch to the proper position. Provision is made to clearly indicate the switch position. The cap provides a weather-proof, pressure-tight seal.

2. The switch is mounted on the tank wall rather than on the core-and-coil unit thereby eliminating any shaft alignment difficulties. The switch shaft is brought out of the tank above the oil level.

3. Contact blades are made of beryllium copper. The switch body is of wet-process porcelain.

For additional information contact your nearest Moloney Sales Office. MESS-1



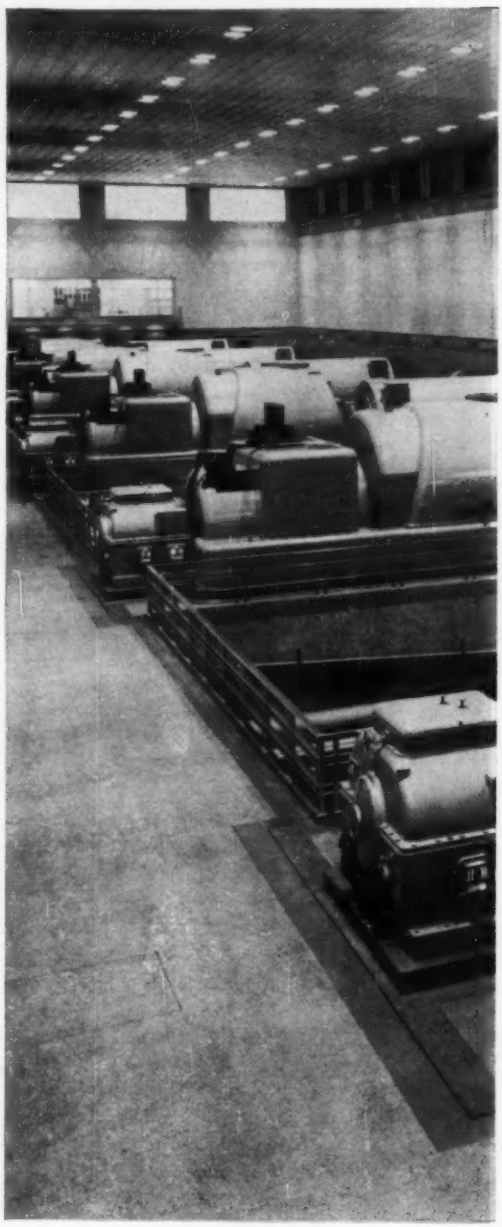
M O L O N E Y E L E C T R I C C O M P A N Y

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

IN GULF'S MARKETING AREA . . .

More power is generated lubricated with GULFCREST



Leading power utilities have been satisfied Gulfcrest users for many years. Many of them depend on Gulfcrest *exclusively*—won't entrust long range turbine protection to any other lubricant!

In some turbines, Gulfcrest has served continuously as long as 20 years . . . and these systems are still free from sludge and rust. Neutralization numbers have remained remarkably low.

FINEST BASE OILS—As one of the largest crude oil producers, Gulf can carefully select the finest crudes for processing. To produce Gulfcrest, 9 different operations are performed on the base oil. And Gulfcrest is the *only* turbine oil super-refined by the Alchlor Process—an extra refining step that removes unstable hydrocarbons not eliminated by normal refining. After being Alchlor Processed, Gulfcrest has greater ability to benefit from suitable additives.

MORE EFFECTIVE ADDITIVES—A special phenol inhibitor, developed by Gulf chemists, retards oxidation of Gulfcrest. An exceedingly effective silicone additive, patented by Gulf, prevents objectionable foaming. Several corrosion inhibitors prevent rusting—and one component has been developed by Gulf to impart superior load carrying characteristics under boundary lubrication conditions. Gulfcrest is *made* to give top turbine performance!

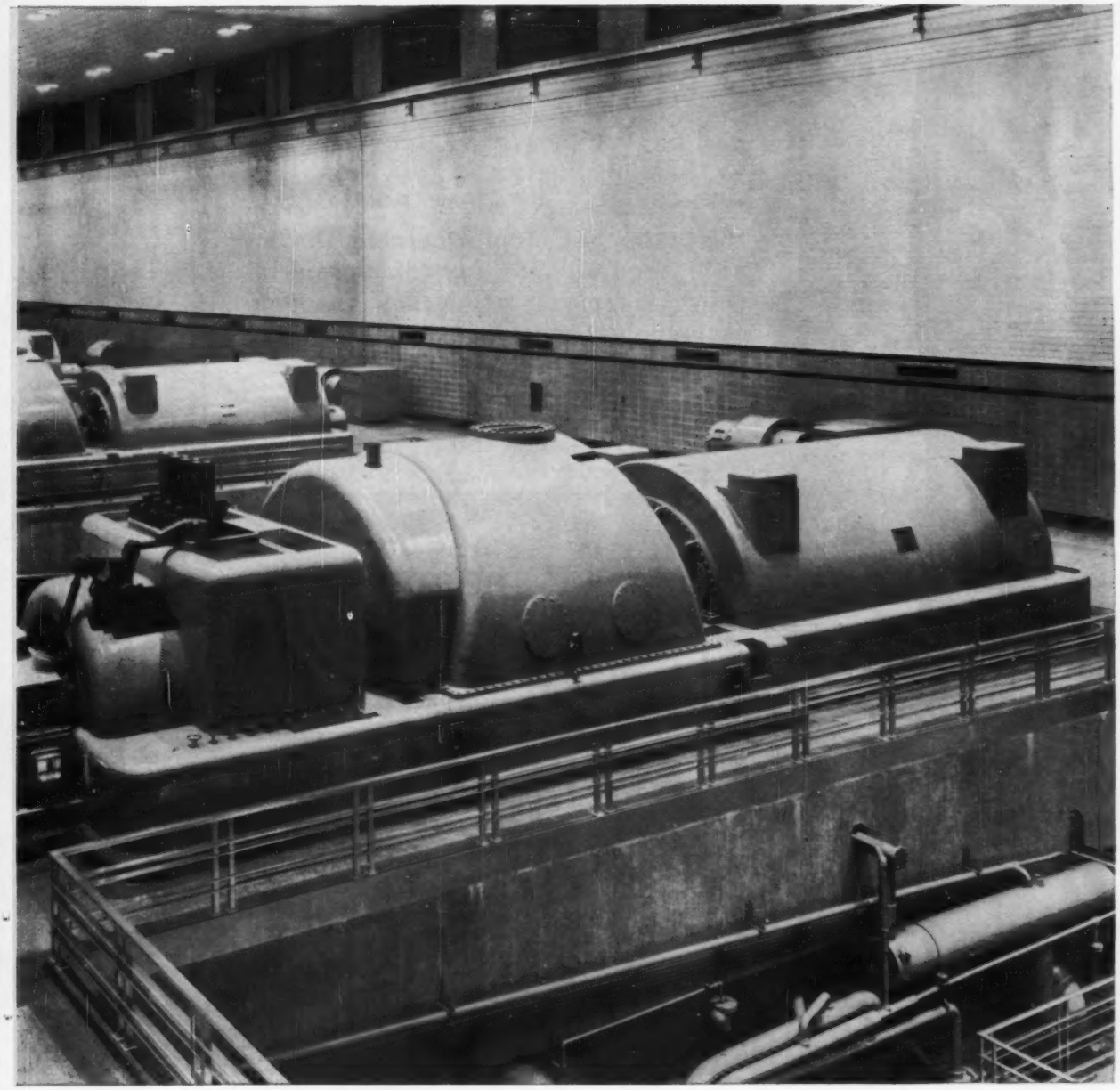
Get the full story on Gulfcrest . . . its great record in fighting oxidation and protecting against corrosion and wear. A Gulf Sales Engineer can give you the facts. Just call your nearest Gulf office. Or write us for a free copy of the new Gulfcrest booklet.

GULF

GULF OIL CORPORATION
Department DM
Pittsburgh 30, Pa.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

by central station steam turbines than with any other oil!



All 6 steam turbines lubricated with Gulfcrest! These units, in the O. H. Hutchings Station of Dayton Power & Light Company, get safe, sure protection with super-refined Gulfcrest turbine oil.

Note this Nameplate Carefully—

TOOL OPERATED DISCONNECT

CAT. NO:	4752	KV, NOMINAL:	15
KV, MAX. DES:	15	KV, IMP. WITH:	95
AMP, CONT:	400	AMP, MOM:	20000

This is an S&C Tool Operated Disconnect. Used with S&C's Loadbuster, it can switch the circuit under any condition except short circuit—without external arcing.

U S PATENTS PENDING

S&C ELECTRIC COMPANY
CHICAGO

Made in U. S. A. G-3448

It means—

1. universal low cost load switching throughout your distribution system by use of LOADBUSTER®, the portable loadbreak tool; for loads up to 400 amperes and with system voltages through 14.4 kv;

2. station-type disconnect performance at distribution disconnect prices;

3. S&C stands behind this disconnect's performance with full published short-time ratings and insulation values—values which cannot be matched in the distribution field;

4. an inexpensive device for duties normally handled by group-operated disconnects, station-type stick operated disconnects, and conventional load interrupters.

Now look how Loadbuster works

Attached to a universal pole, LOADBUSTER is simply hung on the attachment hook of this new Tool Operated Disconnect, and the pull ring hook inserted in the pull ring. As the pole is pulled downward the disconnect is opened, LOADBUSTER trips, breaking the circuit positively. It's that easy!

S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Illinois.
In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.

The News-Scope

LATE NEWS ▸ **Utah P&L proposes to pay $2 million for control of Telluride Power Co,** operating in southern Utah. Deal is now pending before Utah, Idaho and Wyoming regulatory bodies and the SEC.

American Gas & Electric may change its name to American Electric Power Co to "emphasize the fact we are an all-electric company." Shareowners will decide at the annual meeting, April 30.

Westinghouse, with record net sales for 1957 and its final quarter, shows net income of $72,652,000 or $4.18 a share for 1957, compared with $3,492,000 or only 10¢ a share in 1956. Net sales billed were $2,009,043,000 for 1957; $531,770,000 final quarter.

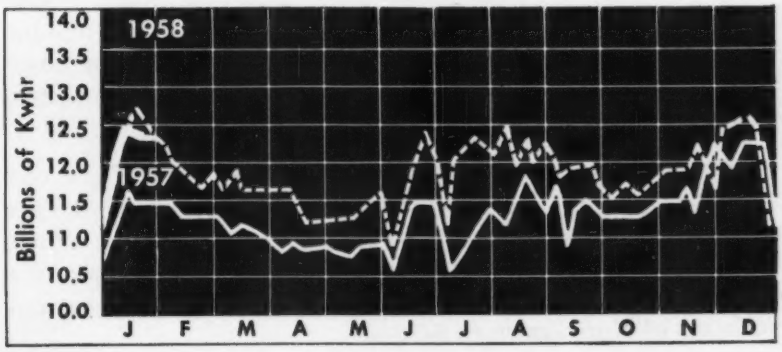
New Indiana PSC ruling revamps "inconsistent" utility accounting for federal income taxes deferred because of accelerated depreciation. State's utilities, during period of tax deferment, formerly charged to "Provision for deferred federal income taxes" and credited to "Appropriated surplus arising from deferment of federal income taxes" amounts equal to tax savings resulting from using larger accelerated depreciation deduction. PSC now orders such amounts to be credited to "Reserve for deferred federal income taxes."

Management changes . . . Paul Hallingby, former VP, Middle South Utilities, admitted as general partner in White, Weld, & Co . . . First woman officer of Arkansas P&L is Mary Nichols, asst. secretary.

FUTURE NEWS ▸ **Look for a fierce fight by NRECA** to hold federal appropriations to present levels. The group also wants the 2% interest rate held.

A bill to allow TVA's 150 distributors to own and operate TVA electric properties will soon be introduced in Congress. Distributors would pay the U.S. for the properties, along with back interest. Bill would be follow up of plan by W. Von Tresckow (EW, 8/19/p 70).

Power Output—Down 0.1% (Week ending Jan. 25), Kwhr 12,399,000,000



Per Cent Change From Previous Year

	Jan. 11	Jan. 18	Jan. 25
Total U.S.	+1.5	−1.2	−0.1
New Eng.	−0.1	−1.3	+0.7
Mid. Atlan.	+0.3	−2.0	−0.1
Cent. Ind.	−2.1	−4.4	−2.6
West Cent.	+0.4	−2.2	−0.3
Southeast	+6.4	+0.8	+3.0
South Cent.	+3.9	+2.9	+2.8
Rocky Mount.	+5.0	+2.7	+2.7
Pacific			
NW	−1.5	−5.9	−7.6
SW	+2.1	+4.9	+2.4

Seasonally Adjusted Index 227.4

Week Ago 227.7 Year Ago 227.6

Atomic Energy Commission requirements—1,050,000,000 Kwhr (Electrical World estimate). Excluding AEC, output decrease was 0.8%

The Electrical Week

EVENTS ▶ **Can a municipality force a utility to build transmission lines** underground instead of overhead? Cleveland Electric Illuminating Co has locked horns in court with the city of Euclid in a battle of low rates and the economic prosperity of an industrial area vs. public safety, real estate values, and clear TV reception. CEI says a 1906 franchise ordinance authorizes it to build overhead lines. Euclid says a new ordinance overrides the 1906 franchise. Decision won't come for weeks (p 58).

WASHINGTON ▶ **Southwestern Gas & Electric has filed suit against federal** government to recover some costs it considers wrongfully disallowed for tax purposes by Bureau of Internal Revenue in the period 1947-50. Of a $49,000 total, company spent $23,000 on ads. It seeks a $20,000 reinstatement. This is the first such action relating to the bookkeeping of advertising costs for income taxes (p 59).

ATOMIC PROGRESS ▶ **Here are two big conclusions that may be drawn** from recent news that U.S. and British scientists have achieved momentary, controlled thermonuclear reactions in lab experiments: (1) The high temperatures created promise an insight to problems of making fusion practical and, (2) Harnessing the fusion process is feasible (p 56).

SYSTEM ENGINEERING ▶ **An automatic load-frequency-control system corrects** and maintains system frequency, monitors scheduled interchange on four big interties, and distributes load burden on specific machines. The control system has worked well, reports Niagara Mohawk Power Corp. It loads generators near ideal incremental heat rates, holds rate of generation change to limits of associated boilers, and telemeters data constantly and reliably (p 72).

DISTRIBUTION ▶ **A high percentage of accidents on transformer poles** led to the idea of encasing primary risers in flexible polyethylene tubing to yield complete protection between bushings and cutouts, reports Central Illinois Public Service (p 74).

SUBSTATIONS ▶ **The cost of power transformers may climb** if the buyer specifies impedances outside an "optimum" design range. Such factors as core saturation, shipping limitations, sound levels, and special requirements of the purchaser affect impedance—and price—and the buyer should weigh the higher initial cost against anticipated system benefits (p 67).

To win acceptance for its residential substations without the cost and maintenance of false-front buildings, Con Edison of New York landscapes the grounds with hemlocks, white pine, blue spruce, laurel, andromeda, rhododendron, and purple barberry. One of the company's stations won a "Plant America" award of the American Association of Nurserymen (p 64).

A TWO-MINUTE PREVIEW OF THIS WEEK'S ELECTRICAL WORLD

METERING ▶ **Measuring ac-network-vault loads** with permanently installed equipment yields a five-way advantage over the old method, reports Commonwealth Edison Co. Replacing crews that toted portable equipment from vault to vault—one crew gathering data from 20 in a week's time—the new technique (1) Cuts measuring costs in half, (2) Releases some equipment and engineers, (3) Enables technicians to process the data, (4) Offers maximum load data at all times, and (5) Cuts instrument maintenance **(p 70).**

INDUSTRIAL ▶ **Coaxial cables used to transmit power** from high-frequency induction heating generators to work coils have cut power losses, provided better control of heat, and practically eliminated r-f interference for an aircraft manufacturer **(p 90).**

MANUFACTURERS ▶ **New insulation system for distribution transformers** may increase permissible operating temperatures by retarding breakdown of insulating papers and cloth **(p 113)** . . . A 230-kw "direct burial" oil-filled cable, having its own water cooling system, has been installed at Niagara Mohawk Power's Huntley Station **(p 114).**

NEW EQUIPMENT ▶ **Insulated crane basket withstands 12.5-kv** continuous contact . . . One-piece cable connector comes in six sizes . . . Air motor jack can pull 90-ft, Class 2 pole from dry earth **(p 92).**

SELLING ▶ **Indianapolis Power & Light has promoted electric heating** for three years now, using 12 open houses to woo the public. It has stimulated interest of architects, builders, and manufacturers in resistance heating and heat pumps. Here's how this program will pay off now, and in the future **(p 62).**

HEATING & COOLING ▶ **The heat pump heroically rescued a drive-in theater owner** who wanted to build a compact restaurant-snack bar in the center of the parking lot. To be used year-'round, it could have no chimney, basement, or cooling towers, and might require air conditioning in one part while requiring heat in another **(p 86).**

TAXES ▶ **State and local taxes are on the rise.** Revenues are not meeting expenses. The state corporate income tax is one source of revenue now being examined by several states **(p 107).**

PEOPLE ▶ **California Electric Power** makes Willis T. Johnson vice president and ass't general manager . . . Southwestern Electric Service names Hollis Duncan head of new system operating dept and Oscar Garner purchasing agent . . . John A. Roebling's Sons elects W. C. Ridge and E. G. Hartmann to vice presidencies **(p 115)** . . . Sylvania Electric Products elevates F. J. Healy and Dr B. S. Ellefson to senior vice presidencies **(p 116).**

Nuclear power plants will eventually produce power at very low costs, if everything works out right. Available data indicates that 10-mill nuclear power in the U. S. is still a possibility in the not too distant future. Capital costs will likely remain high for even second and third generation plants so total low costs must be achieved by obtaining low net fuel costs. Breeders and regenerative reactors appear as the most promising way of doing this.—**James Lane, Nucleonics, Jan 1958.**

Six public utility predictions for '58: 1. No TVA legislation. Watch for an attempt to put TVA on a self-supporting basis with bond issues, spurred by Eisenhower-appointed directors. But Democratic Congress is not likely to go along. 2. Northwest public power pushers will fight electrification by private companies. 3. Slashes in public works programs due to increased defense spending. 4. AEC-built atom plants. It's likely that the Administration and Congress will agree AEC should directly build more A-plants. 5. Increased state regulation precipitated by inflation-prompted rate hike requests. 6. Accelerated depreciation. States will ponder whether utilities should "normalize" taxes to reap A-D advantages.—**F. X. Welch, Public Utilities Fortnightly, Jan 2, 1958.**

TECHNICAL NOTES

Microwave tubes with high stability, gain and efficiency, and an intermediate bandwidth are being explored. This new tube would use "extended interaction:" a moving electron stream interacts with a traveling electric field in a long resonator, rather than with a fixed field.

All-electrical controls will almost completely supersede present-day pneumatic controls for boilers in high performance power plants of the next decade, according to recent trends of boiler control in Great Britain.

Draft loss is the most satisfactory practical criterion of the degree of cleanliness of a boiler in service. When draft loss becomes one and a half times that of a clean boiler, the unit should be taken out of service for cleaning.

FROM EDITORS IN THE FIELD

Linemen will be more prone to "rubber-up" if the rubber protective gear on the line truck is stowed for convenient removal. Rather than stow protective gear wherever there is space, one Eastern utility is planning a line truck body built around protective gear.

"I'm Glad They Thought of Me"

SPRING-CONTROLLED KEEPER IN NEW O-B CLAMP MAKES LINEMAN'S JOB EASIER

The new O-B 88500 Universal Clamp was obviously designed with the convenience of the lineman foremost in mind.

The clamp stays open automatically while he does the forming and bending of the conductor . . . held open by a special spring clip. He doesn't have to fumble with loose nuts, bolts, washers or keeper pieces since there is no need to remove them at any time. Installation can be made entirely from one side of the clamp. It can be worked with the line hot or dead.

Made of malleable iron, taking conductors between .20 and .50 inches in diameter, this new clamp offers an obvious way to make the lineman's job easier.

Besides keeping the lineman happy, use of this new 88500 clamp is the sure way to faster, more efficient deadending on your distribution lines.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

Special spring holds keeper open.

Distributed by GraybaR ELECTRIC COMPANY

4860-H

Users Told Us, "If you could do it, it would be wonderful"

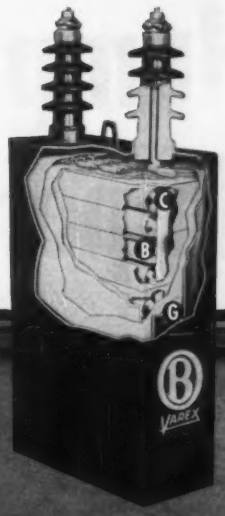
One of the critical points in any capacitor is the point where current is introduced into the element.

That's because the electrode is aluminum foil only .00025 inches thick. The paper this information is printed on is about 10 times as thick as the foil in Varex. It's obviously difficult to make a positive contact with a material this thin . . . a contact that won't be vulnerable to damage caused by transient voltage conditions.

In the Varex capacitor, you see a simple but effective answer -- a contact maintained by spring pressure.

Capacitor users told us, before Varex went on the market: "If you can do it with spring pressure, it would be wonderful. But we've been told it can't be done."

Well, it has been done. The secret is in the extended foil principle found only in the Varex element. Foil extends at either end of the element, outside the insulating paper. Then it be-



Two springs (G) at each end of element hold contact plate (C) firmly against extended foil (B).

it is...

Spring-Pressure Contact

comes a simple matter to press a large contact plate against the foil and to maintain pressure with springs -- springs which act like strong, tireless hands to maintain a good contact.

All this has an important bearing on the unit's ability to handle extra-heavy current duty. Current stress is lessened at the critical contact point because of the multiplicity of contacts -- every turn of foil contacts the plate twice. This means a smaller amount of current flow through each contact.

This effective, low-stress electrical contact system is one of many important reasons for using Varex capacitors.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

4877-H

"Why is a Hump in a Cotter Pin so Important?"

Used on O-B Hardware, Humped Cotters Save Hours Compared to Conventional type

How many cotter pins do your line crews install and remove in a year? Chances are the total runs into the thousands . . . thousands of opportunities for time to be wasted . . . plus countless other opportunities to forget to bend the end as is required on a standard cotter pin, or to bend it improperly.

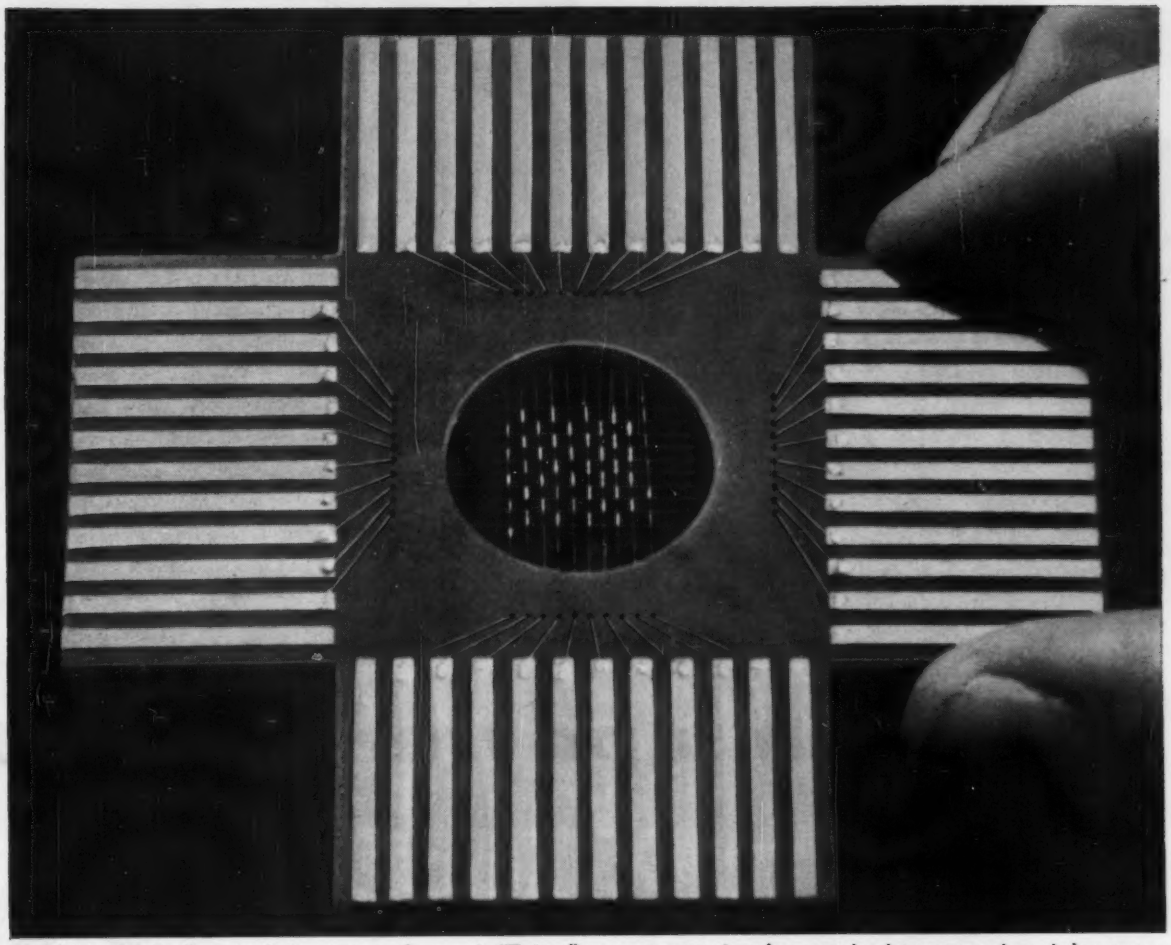
But O-B cotter pins have a hump. That means the ends don't have to be bent. The pin goes in easily. It stays regardless of how much vibration there is. And it can be pulled out just as quickly as it was put in . . . no ends to unbend before removal.

A hump in a cotter pin is a little thing, but it has obvious benefits for the user of O-B hardware. This is typical of the design features that characterize the O-B hardware line . . . from the smallest to the largest items the line is made for the user's convenience.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

4863-H

Humped cotter is ideal for hot line work.



Model (simplified) illustrates basic structure of magnetic "Twistor" memory—magnetic and copper wires interwoven as in a window screen. Twisted condition of the magnetic wire shifts preferred direction of magnetization from a longitudinal to a helical path. One inch of twisted wire, thinner than a hair, can store as much information as ten ferrite rings. "Twistor" was invented at Bell Laboratories by Andrew Bobeck, M.S. in E.E. from Purdue University.

New twist in memory devices

An ingenious new kind of magnetic memory has been developed by Bell Laboratories scientists for the storage of digital information. Known as the "Twistor," it consists basically of copper wires interwoven with magnetic wires to form a grid.

"Twistor" gets its name from a characteristic of wire made of magnetic material. Torsion applied to such a wire shifts the preferred direction of magnetization from a longitudinal to a helical path. This helical magnetization has been applied to produce a magnetic storage device of unprecedented capacity for its size.

In a magnetic memory, information is stored by magnetizing a storage element. In conventional memories the storage elements consist of rings of ferrite. In the "Twistor," they consist of tiny segments of hair-thin magnetic wire. At each intersection of the grid, one such segment is capable of storing a binary digit.

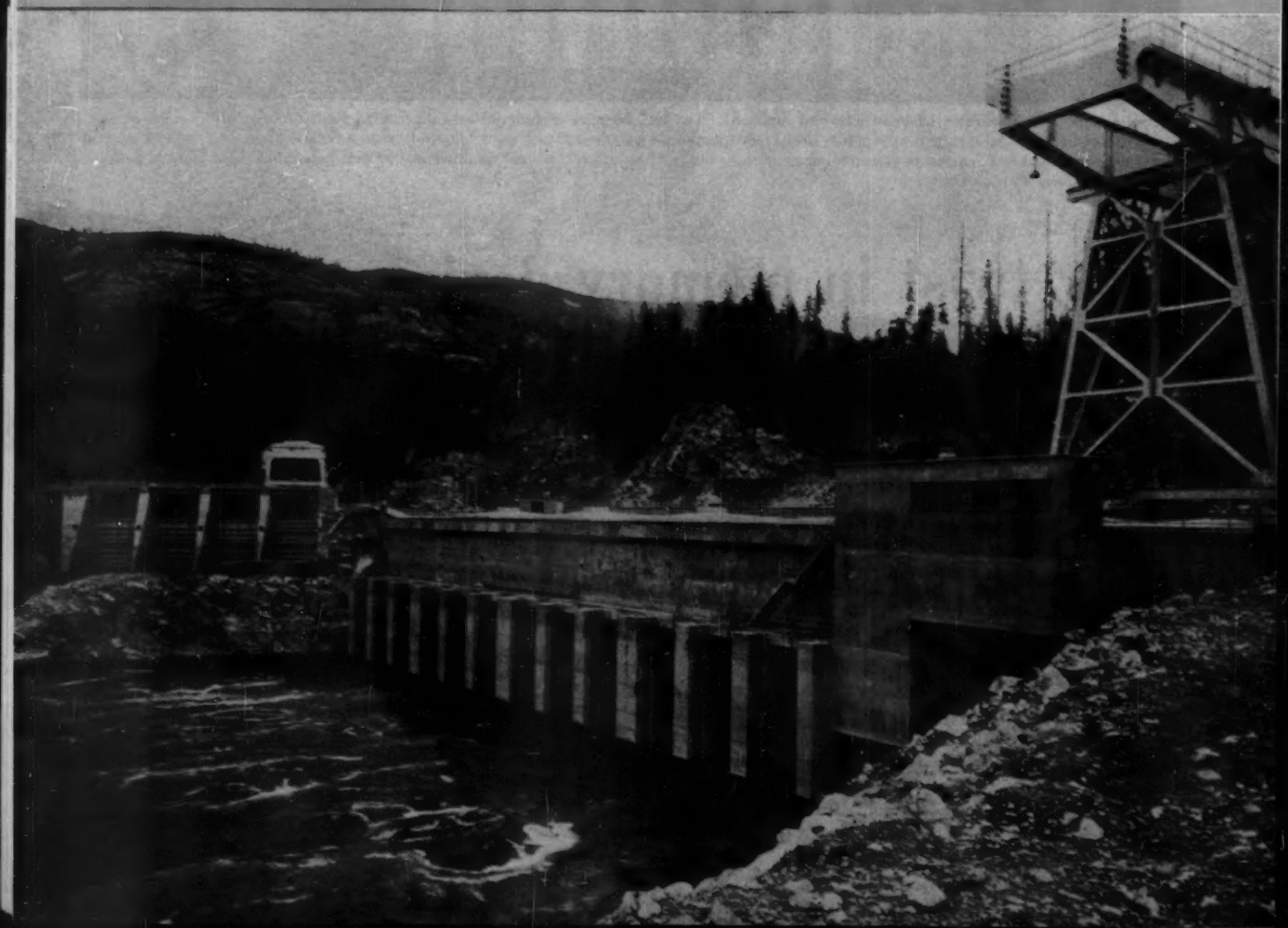
The "Twistor" is simple and economical to fabricate, and its minute energy requirements are easily supplied by transistor circuits. Bell Laboratories engineers see important uses for it in future telephone systems which demand the compact storage of much information, as well as in digital computers for civilian and military applications.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

. . . in the
Pacific
Northwest

four more ELLIOTT generators add to the region's power supply!



Liberal generator design provides "bonus" revenue

The Box Canyon hydroelectric generating plant is one more example of how Elliott design and engineering reduces the cost of construction, installation, and operation . . . and in this case, resulted in "bonus" revenue.

Liberal design of the turbines and generators combined to provide an unusually high output power delivery. As a result, the four generators, each nominally rated at 15,000 kw, 100 rpm, 60 C rise are delivering in excess of 75,000 kw under the same temperature-rise conditions. Since three-quarters of the station's capacity is sold to other utilities, this provides welcome extra income for the owner, Public Utility District No. 1 of Pend Oreille County, Washington.

The hydro station was erected on the picturesque Pend Oreille River located in a valley between two ranges of the Selkirk mountains, seen at the left. The plant features economical single-story design with roof hatchways above each of the generators. A gantry crane is available to handle routine inspection and maintenance. Plant and dam were designed by Harza Engineering Company, Chicago, Illinois.

Three of the four Elliott umbrella-type vertical generators are seen above. They were engineered by Elliott to achieve compact design, to reduce machine height, and to give pleasing appearance. Large doors between arms in the lower bracket afford access to the Kingsbury bearing for inspection of shoes. Here is another illustration of how Elliott generator engineering provides liberal design, high efficiency, and long-term dependability. For literature, call your Elliott representative or write . . .

ELLIOTT Company
RIDGWAY DIVISION
RIDGWAY, PENNSYLVANIA

NEW—

hydro-generator bulletin

describes construction features

This well-illustrated booklet—just printed—describes the important electrical and mechanical design features of Elliott generators.

shows typical installations

Includes pictures of umbrella and suspended-type vertical generators, large and small, as well as horizontal hydro-generators.

Ask for your copy Today!

R7-13

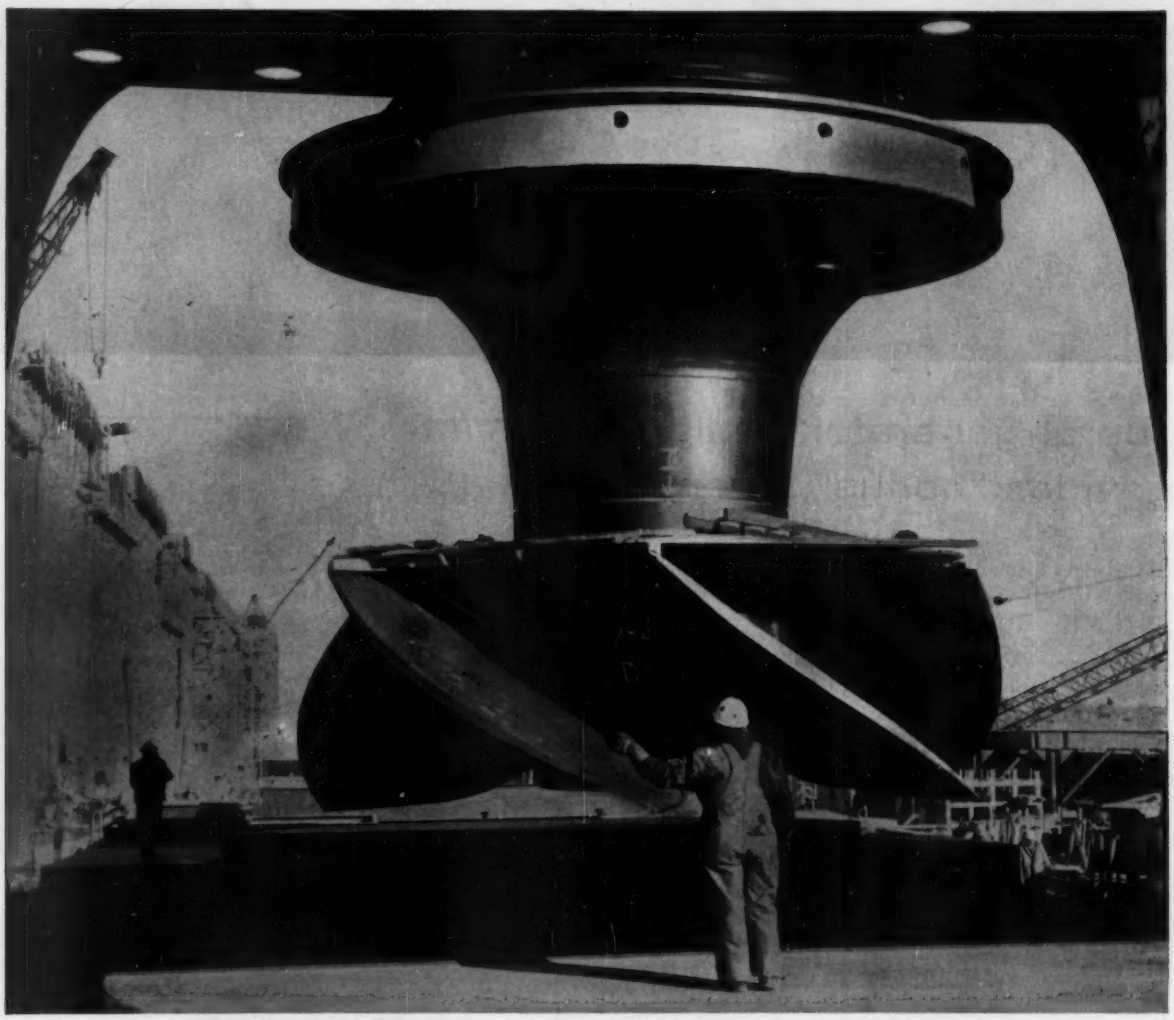
B-L-H hydraulic turbines are a vital part of North America's mightiest engineering feat

Sketch of Barnhart Island Powerhouse, courtesy Power Authority of the State of New York.

The St. Lawrence Seaway and Power Project is the largest engineering feat ever undertaken on the North American continent. Involved in it is the relocation of main highways, railroads, navigation facilities, and, in certain instances, entire towns. The Power Project alone will call for 86 million cu. yd. of excavation.

All power will be generated at the Barnhart Island Powerhouse, where deliveries are now under way on an order for eight Baldwin-Lima-Hamilton fixed blade propeller turbines. Each of these giants is rated to produce 85,000 hp at 94.73 rpm under 81-ft. head. The last of the eight B-L-H units for this enormous Canadian-American undertaking is scheduled to be completed and ready for shipment in Dec. 1958.

The St. Lawrence Power Project is only one of the many hydroelectric operations throughout the world that have called upon B-L-H's 130 years' experience in designing and building hydraulic turbine equipment. For specific information about our products and services, write to B-L-H Corporation, Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth Street, San Francisco 10, Calif.



Installation at the St. Lawrence Power Dam, Barnhart Island, N.Y., of a fixed blade propeller turbine runner built by B-L-H's Eddystone Division. Photograph courtesy Power Authority of the State of New York.

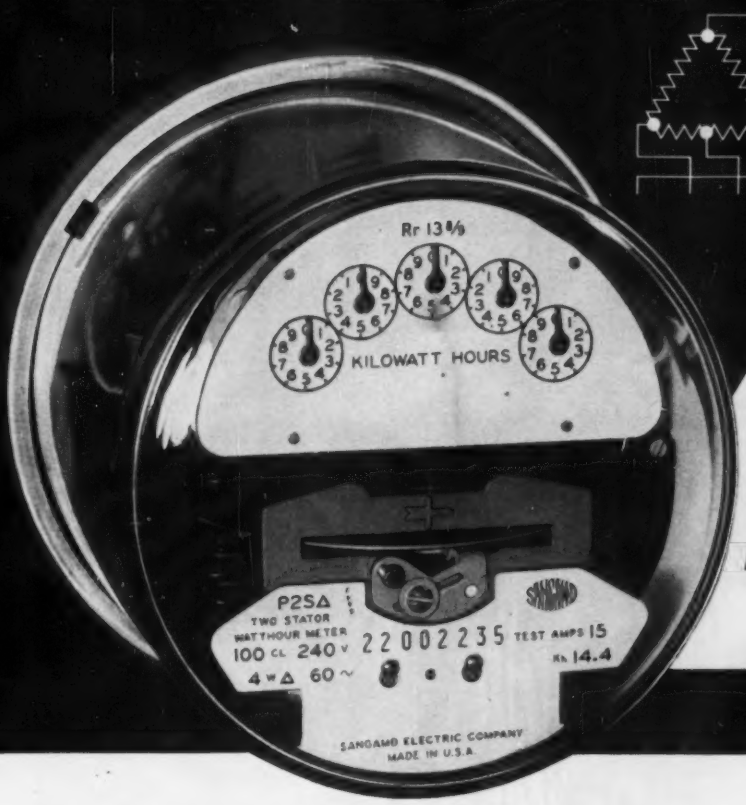
BALDWIN · LIMA · HAMILTON

Eddystone Division

Philadelphia 42, Pa.

Hydraulic turbines • Weldments • Dump cars • Nonferrous castings • Special machinery • Bending rolls • Machine tools

NOW...Sangamo Presents...



A NEW TWO-STATOR FOUR-WIRE DELTA METER

for new advantages in 240v measurement

GREATER RANGE OF APPLICATION—Extended range, in both directions, lets the Sangamo P2SΔ Meter start at ¼% of rated load—yet operate continuously at 666⅔% of rating with only 50°C maximum temperature rise. You can use this meter for small loads and large ones.

EASIER ADJUSTMENT AND MAINTENANCE—All adjustments are easy to reach and make—direction of effect is indicated—backlash is eliminated. Low friction register is simple in design, provides automatic mesh adjustment. Potential coil can be easily replaced without any disassembly of other components.

HIGHER INSULATION LEVEL—The individual windings of the current coil are encapsulated in chlorinated polyether insulation of high dielectric strength. Voltage breakdown is in excess of 10,000 volts RMS—the equivalent of a 15 KV surge.

SAVINGS IN HEIGHT AND COVER REPLACEMENT
The Sangamo P2SΔ Meter has been substantially reduced in height. The cover is the same as that used on all singlephase metal base socket meters manufactured since 1936.

PROVEN ECONOMY THROUGH SLOW SPEED
Sangamo *slow speed*—proved so well on the singlephase J2 Sangamo Meter—gives even greater benefits in two-stator meters. Reduced series damping and fewer revolutions just naturally mean greater accuracy and better performance.

THE COMPLETE LINE OF LIFETIME GUARANTEED SANGAMO TYPE P METERS WILL HANDLE ALL POLYPHASE MEASUREMENT

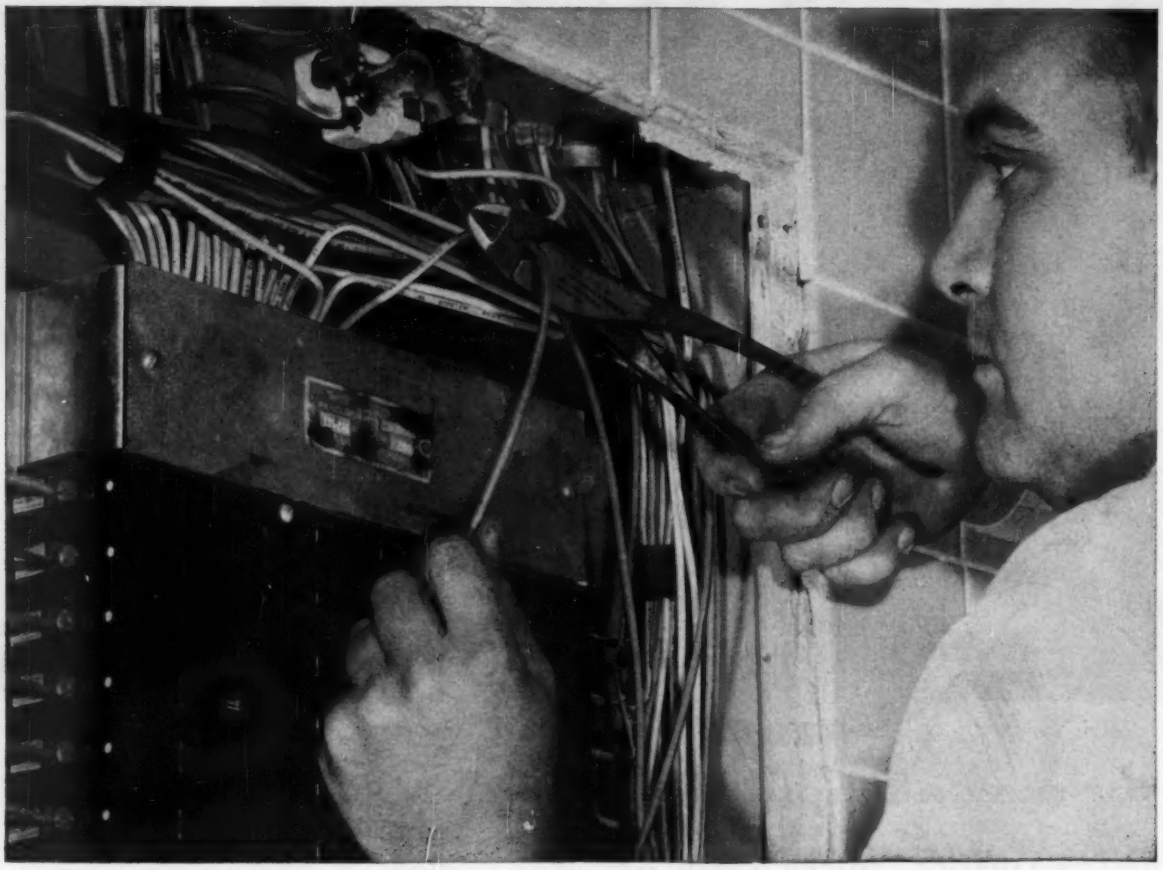
SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

JH57-9

News about

B.F.Goodrich Chemical *raw materials*



For a lifetime of adequate wiring . . . ***insulation of Geon***

BUILDING wire insulated with Geon polyvinyl materials is playing a prominent role in today's adequate wiring movement for homes and buildings. And for good reason.

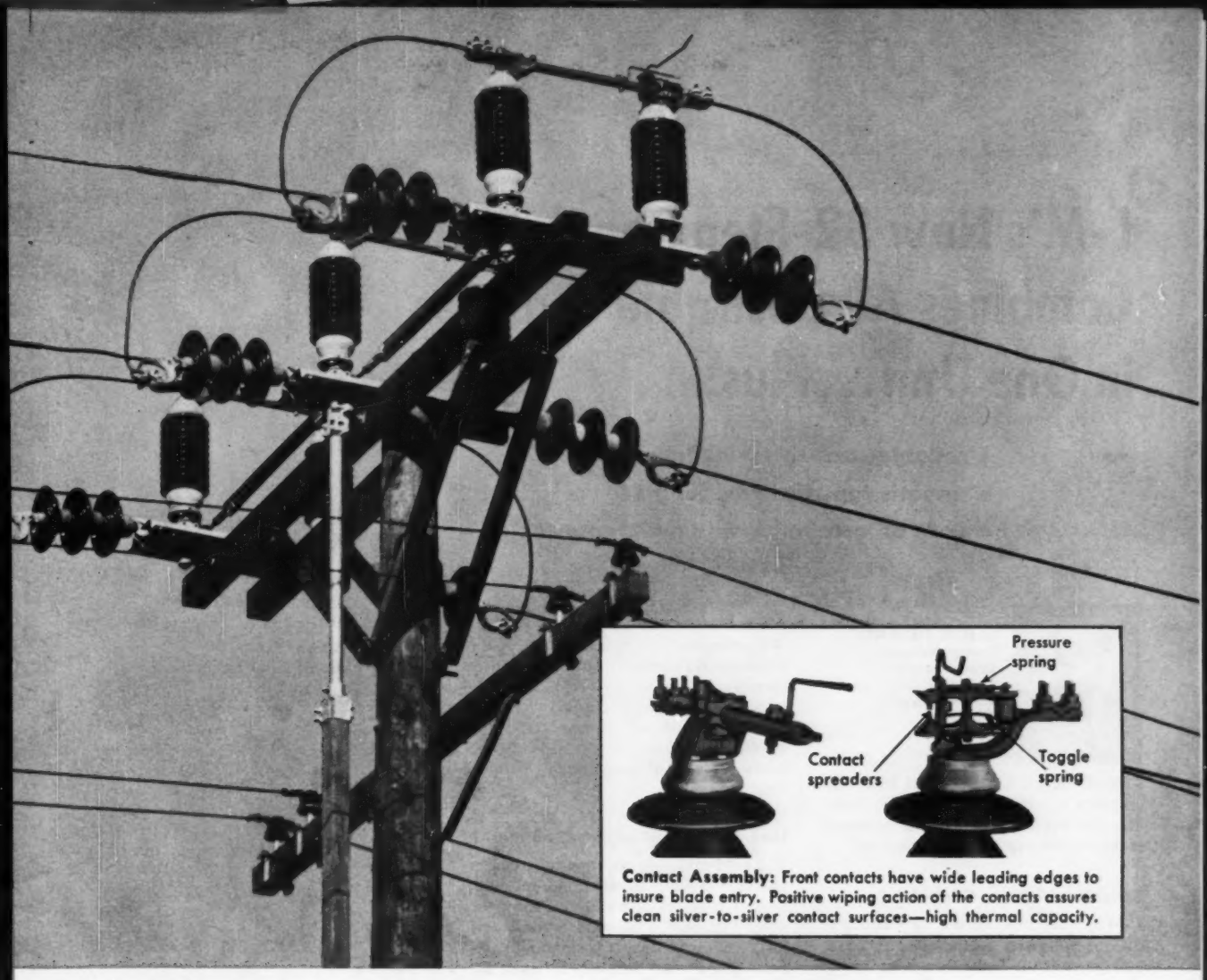
These materials have exceptional properties that give TW building wire many desirable features: smaller overall wire diameters are possible because of improved insulating ability; permanent fire resistance; resistance to acids, oils, alkalies, dampness, fungi and voltage breakdowns. Since Geon polyvinyl materials have exceptional aging characteristics, insulation maintains strength and flexibility.

Owners like the safety and dependable service these "Geon-insulated" wires provide through the years. Contractors prefer them for their good flex, clean stripping qualities, toughness, abrasion resistance and the ease with which they pull through studs, joists and conduits.

For information write Dept. LR-2, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors



Contact Assembly: Front contacts have wide leading edges to insure blade entry. Positive wiping action of the contacts assures clean silver-to-silver contact surfaces—high thermal capacity.

L-M's New Side-Break Switch Is Rugged, Reliable and Easy To Operate

Line Material has designed a new, rugged side-break switch which has all the desirable operating features of a dependable switch for both line and substation sectionalizing.

Only six current transfer points with high-pressure silver-to-silver contacts and heavy back-up mass provide high thermal capacity for continuous or short-time fault currents. Straight-line current path minimizes short circuit forces tending to open switch. Minimum frictional drag at rotating terminal is achieved by current transfer on center of rotation. Rugged full-floating contacts swivel to give smooth, easy operation, positive wiping motion, and definite ice-breaking action.

Positive Toggle Action

Wide-angle leading edges on front contacts insure blade entry regardless of alignment, with no loss of contact pressure. Contact-positioning spring has positive toggle action to hold the contacts in the open position (45° from switch centerline) or firmly in the closed position. Ease of operation and long contact life result, because contact spreaders preload pressure springs for minimum contact movement during blade entry. Wide-spaced contact jaws and clearance around moving parts facilitate positive switch action under severe ice or corrosion conditions.

Silicone-Lubricated for Life

All bearings and moving joints on the switch are silicone-greased—lubricated for life, and positively sealed with silicone cord rings. Water, dust or dirt cannot enter to affect bearing operation.

Get Complete Information

L-M's new side-break switch is available in 600 amperes, 7.5 to 69 kv as a single-pole, or up to a six-pole unit. Ask your L-M Field Engineer for information and bulletins on L-M's Power Switching Equipment. Or write Line Material Industries, Milwaukee 1, Wisconsin.

McGRAW EDISON

LINE MATERIAL Industries

McGRAW-EDISON COMPANY

Power Switching Equipment

302

L-M's New 32-Step Regulator Combines All Desirable Features in One Unit... Plus:

- reliable, accurate regulation
- smooth tap changes, long life
- ease of installation and maintenance

by **N. K. DELANEY**
Product Manager, Capacitors and Regulators, Line Material Industries

Line Material has designed into one compact, efficient regulator all the desirable features found in all other standard makes—plus a few L-M "exclusives."

Sensitive Voltage Control

L-M uses an induction disc-type contact-making voltmeter for reliable, accurate voltage control. The unit is very sensitive, and easily adjustable to a band width of from plus and minus ¾ to plus and minus 6 volts. An integrated time-delay device is used to control the tap-change operation. The time delay can be adjusted independently on both "raise" and "lower" through a range of from 10 to 120 seconds.

Maximum Contact Life

The tap-changing mechanism on L-M's new 32-step regulator is designed to assure smooth operation and maximum contact life. The speed of the tap changer is hydraulically controlled to assure minimum arcing. This, plus a reactor which bridges across adjacent taps during operation, permits smooth tap changes, without current interruption or voltage dip.

Easy to Inspect

The complete internal assembly of the regulator is suspended from the cover to simplify untanking for periodic inspection and maintenance. This desirable feature permits you to inspect all mechanical and electrical parts quickly and easily without draining oil or dismantling the unit.

Less Bending Moment On Pole

The L-M exclusive obround tank design makes the unit smaller, lighter, with shorter moment arm distance from the pole. The unit is easier to handle and install, and the design substantially decreases the total bending moment on the pole.

Greater Current Capacity With ADD-AMP Feature

It is possible to increase the load-carrying capacity of L-M's new regulator up to 160% of its normal rating by reducing the regulation to ±5%. The range of regulation can be reduced externally without de-energizing the regulator.

Get More Information

Ask your L-M Field Engineer for more information on L-M's new 32-step regulator—the regulator with all the best operating and convenience features available on any and all other pole-type regulators. Or write Line Material Industries, Milwaukee 1, Wisconsin.

301

Bushings are corona-free, and are designed for minimum radio interference.

Moving contacts and arcing tips of stationary contacts are made of arc-resistant copper-tungsten alloy to assure long contact life.

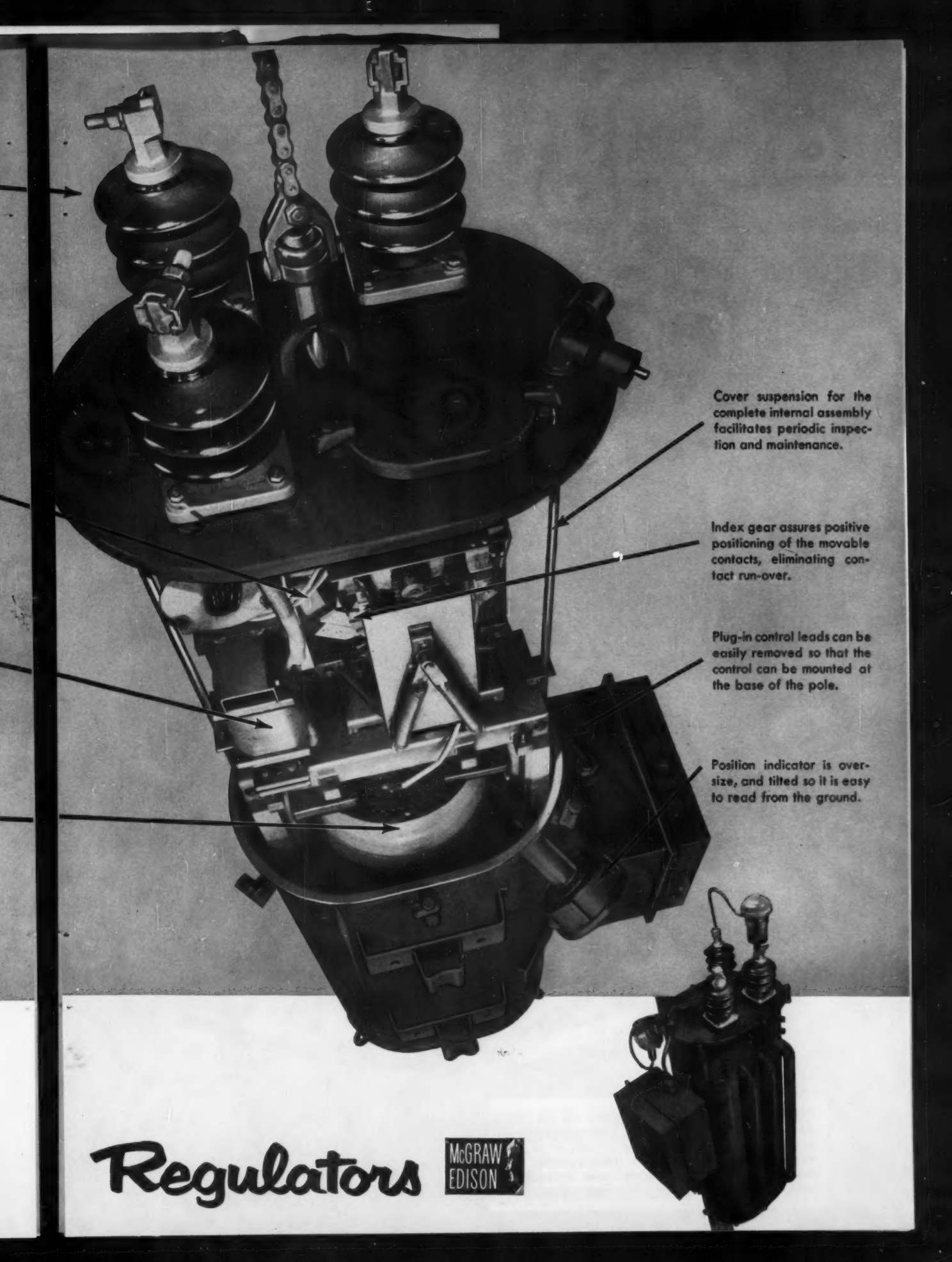
Bridging reactor provides smooth tap changes . . . no current interruption or voltage dip.

L-M's exclusive Round-Wound core-coil assembly provides a balance of low copper loss, low exciting current, and low core loss.

Available Ratings

2500 volts . . .
100, 150 and 200 amperes
5000 volts . . .
50, 100, 150 and 200 amperes
7620 volts . . .
25, 50, 75, 100, 150 amperes

LINE MATERIAL Industries
McGRAW-EDISON COMPANY


Cover suspension for the complete internal assembly facilitates periodic inspection and maintenance.
Index gear assures positive positioning of the movable contacts, eliminating contact run-over.
Plug-in control leads can be easily removed so that the control can be mounted at the base of the pole.
Position indicator is oversize, and tilted so it is easy to read from the ground.

Regulators

McGRAW EDISON

L-M's obround transformer is small, light, and has short moment arm distance from the pole. Total bending moment is greatly decreased and potential capacity of all your transformer structures is increased. Good regulation, high overload capacity and other Round-Wound characteristics have been fully maintained in L-M's obround design.

L-M's Obround Design Provides Less Bending Moment On The Pole

By **D. A. MANNING**
Assistant Product Manager
Transformers
Line Material Industries

L-M's exclusive obround transformer provides a smaller tank with less transformer oil, resulting in a light, easy-to-handle transformer. The obround design also brings the center of gravity of the transformer closer to the pole. The combination of light weight and short moment arm substantially reduces the total bending moment on the pole, and thus greatly increases the potential capacity of all your transformer structures. This advantage was accomplished without changing the outstanding performance characteristics of the Round-Wound® design.

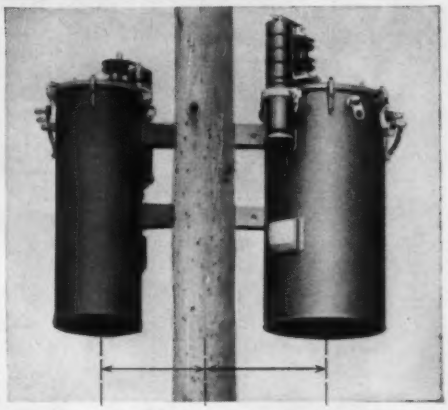
A comparison with four other major makes shows that the low bending moment of L-M's obround design is exceeded by as much as 50%. See the chart.

COMPARE Percent Bending Moment for All Five! See why more customers are selecting L-M obround transformers.

RATING	MANUFACTURER				
2400/4160 Y Voltage	Percent of L-M Bending Moment				
	LM	A	B	C	D
25 KVA	100%	110%	123%	133%	128%
50 KVA	100	123	113	142	120
100 KVA	100	123	115	137	132
167 KVA	100	105	093	115	091
7200/12470 Y Voltage	LM	A	B	C	D
25 KVA	100	131	124	149	126
50 KVA	100	123	110	150	119
100 KVA	100	119	122	149	125
167 KVA	100	107	087	112	089

In addition to reducing the bending moment for equivalent transformer ratings, you can now hang transformers of larger capacity on a pole structure and take advantage of savings such as these:

- Single-pole, three-phase transformer structures can now hold three 50 kva obround transformers instead of three 37½ kva round tank transformers. Thus you obtain 33⅓% more capacity and 15% less bending moment on the pole, and eliminate the need for a costly two-pole structure.
- Three 167 kva obround transformers can now be installed on a two-pole structure, obtaining 67% more capacity and less bending moment on the pole than with three 100 kva older-design transformers.



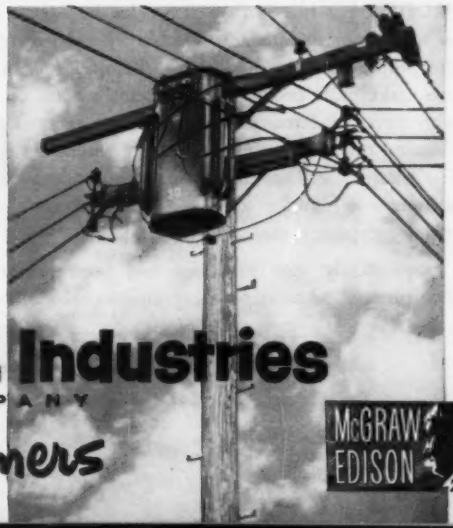
Comparison of these two 25 kva transformers shows how much closer the center of gravity of the obround design is to the pole than with the round design. The result is less bending moment on the pole.

Round-Wound Performance

An outstanding fact to consider on the L-M obround transformer is that, unlike the extremely light transformers of some manufacturers, there has been no sacrifice of performance characteristics. The obround retains all the outstanding performance characteristics of L-M's Round-Wound core-coil design. These characteristics include low exciting current, low noise level, high impulse strength, high short-circuit strength, high short-time overload capacity and many others.

Get Details on L-M's Obround Transformer

Ask the L-M Field Engineer for application information, weights and dimensions on obround transformers and L-M's exclusive Round-Wound design. Or write Line Material Industries, Transformer Division, Zanesville, Ohio.



LM® **LINE MATERIAL Industries**
McGRAW-EDISON COMPANY
Transformers

McGRAW EDISON

THIS MAN'S A SPECIALIST IN PROTECTING YOUR PROFITS. His title is Dowell Service Engineer. His job—to study your maintenance cleaning problems, recommend the proper solutions and apply chemical solvents to help you make more profit. He represents a team of specialists who have rendered old-fashioned all other methods of cleaning product, process and steam generating equipment. His method is Dowell Service, the modern way—using solvents—to remove scale and sludge from all kinds of metal equipment, tanks, piping and lines.

Specifically: one processor had been performing his own turnaround service—using mechanical methods—at an annual cost of $315,000. The Dowell Service Engineer and his team performed the same service in 1/10 of the time at a cost of $2300. The savings in downtime alone amounted to $210,000.

If your maintenance and operating engineers do not know the profit possibilities with Dowell Service, ask them to get the facts for you. For specific information on how chemical cleaning can help your plant to greater profits, call the Dowell office nearest you. DOWELL INCORPORATED —A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY. Headquarters and research center, Tulsa, Oklahoma, with 165 offices and stations to serve you.

chemical cleaning services for industry DOWELL

NOW! A COMPLETE PRACTICAL SPLICING PACKAGE

T&B SHURE splicing means a wide range of connector sizes and types filled with T&B joint compound—vacuum packed in vinyl—installed by the pocket size SHURE Squeezer® for easy, fast, sure service entrance and distribution wiring

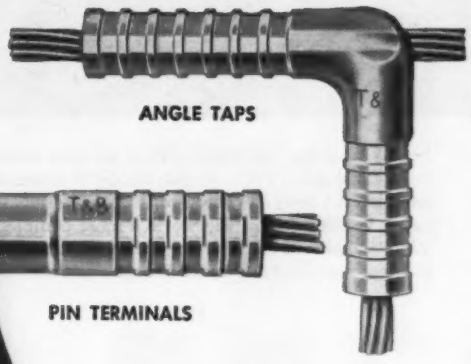
Ask for information on the complete T&B Method line; quality compression connectors for every conductor size and type, *with* the right tools to install them.

ACTUAL SIZE

Splicers are mounted on perforated cards with installing instructions on back. Tear off only what you need.

SHURE feature makes it impossible to remove tool without taking the full bite... assures perfect compression every time.

Patents Pending



ANGLE TAPS

PIN TERMINALS

THE THOMAS & BETTS CO.
INCORPORATED
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898
14 BUTLER STREET • ELIZABETH 1, N. J.
THOMAS & BETTS LTD., Montreal, P.Q., Canada

Please send me your UT5 Bulletin on service and distribution connectors and the NEW UT2.

NAME_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

INTERNATIONAL all-wheel-drive models cover the range from 7,000 lbs. GVW to 45,000 lbs. GCW in conventional and cab-forward design. There is one practically custom-built for every hauling job in the world's most complete truck line. Widest choice of load-moving and load-carrying components to keep operating and maintenance costs lowest.

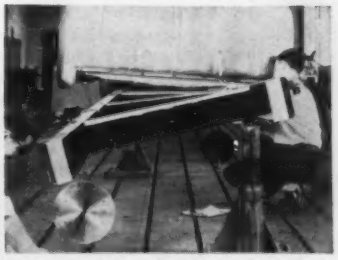
Liveliest performance of any "six" in its class! This Action-Styled INTERNATIONAL with factory-installed service-utility body also has the widest seat and biggest windshield of all. These and many other time-and-money-saving "exclusives" make INTERNATIONAL the value-buy.

INTERNATIONAL TRUCKS

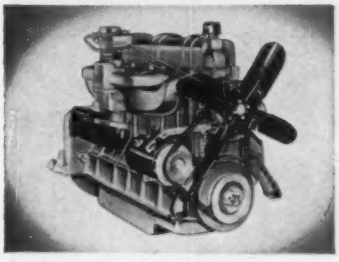
Traction when you need it!

Just one reason why you'll find International Trucks cost least to own!

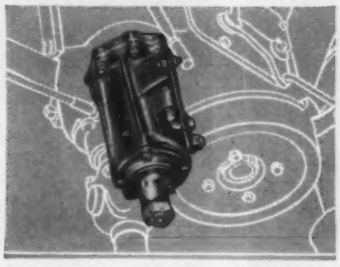
Negotiate rougher terrain and hills. Carry more load in less time—cut operating expenses with all-wheel-drive.



Superior strength Steel-Flex frames are test-proven to combine extra durability with proper flexibility.

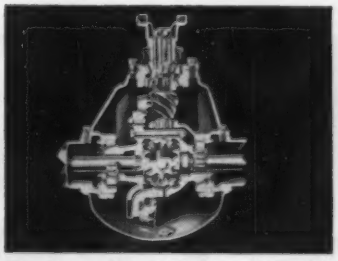


Dependable power and fuel economy with INTERNATIONAL all-truck engines. Gasoline or LPG "sixes" to 212 hp.



Optional power take-off, factory-mounted on transfer case, transmits *full torque* of engine to auxiliary equipment.

Easy to handle in tight spots or on the roughest terrain with true geometric steering, cam and roller mounted gears.



Maximum load hauling, long life axles. Front and rear axles are full floating single reduction type.

INTERNATIONAL Trucks with *all-wheel-drive* are truck-built tough to make a road where there is none.

You get more traction, more sure-footed power because *all wheels are working.* They move you over sinkholes, mud, sand or snow . . . they grab hold to pull business-sized loads up the steepest grades.

What's more, *every* all-wheel-drive INTERNATIONAL Truck is all-truck manufactured in one plant. You get dependable performance that makes the most out of every workday, plus lasting economy of operation and long life. That's why INTERNATIONAL Trucks cost *least* to own.*

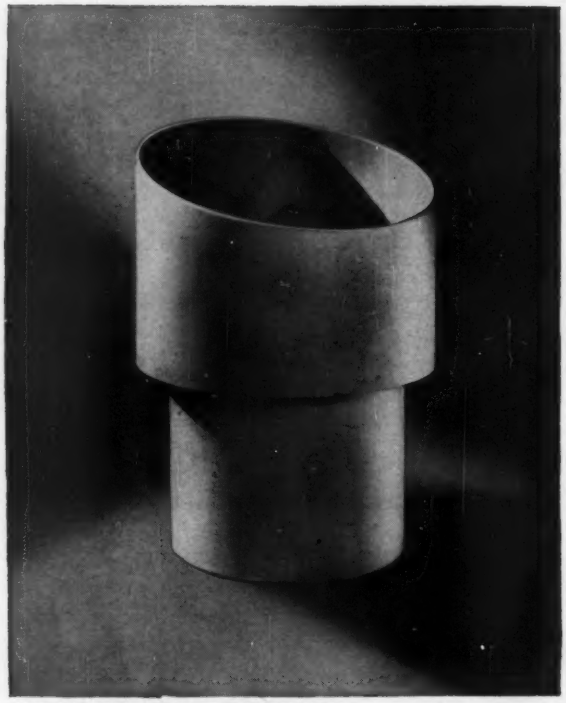
When you need a truck that's *built* to do a truck job better and longer remember the world's most complete truck line. Then see your INTERNATIONAL Dealer.

**Signed statements in our files, from fleet operators throughout the U.S., back up this statement.*

cost least to own!

INTERNATIONAL HARVESTER COMPANY, CHICAGO

Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors



C-D-F HANDLES THE COMPLETE JOB An oil circuit breaker component is made from two Dilecto laminated plastic tubes, with a threaded ring joining the assembly. From raw materials to finish machining C-D-F does it all!

Utilities can depend on equipment containing C-D-F Insulating Parts

The reliable operation and long life of heavy electrical equipment often depends on insulating parts. A good supplier of insulation draws from past experience to make this possible—C-D-F has been a recognized industry leader since 1895! A good supplier expands his research and technical skill consistently—C-D-F offers the *widest range of electrical insulating materials*, from Vulcanized Fibre to C-D-F Products of Teflon.*

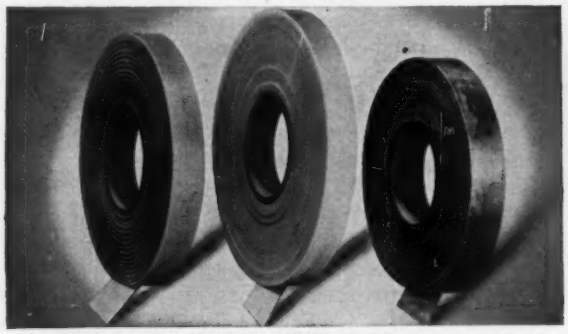
A BIG, RELIABLE SOURCE OF SUPPLY

As a buyer of Utility Electrical Equipment, you gain when your manufacturers work with C-D-F. Quality and dependability of electrical insulation, at reasonable cost, are guaranteed. The latest technical advances and ideas can flow freely between you and C-D-F's engineers. This page shows only a few of the many products C-D-F makes and fabricates for the electrical industry. Consult Sweet's Design File for catalog information, or call your C-D-F sales engineer (sales offices in principal cities)—you'll find he's a good man to know!

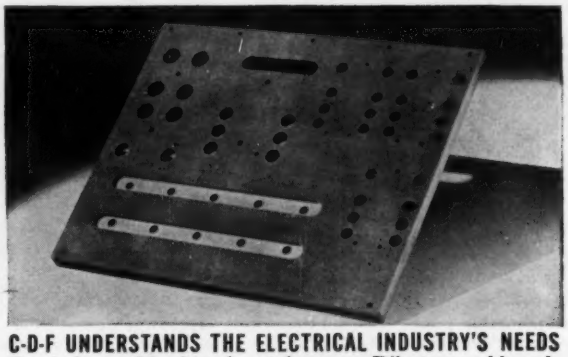
*Du Pont Trademark

CONTINENTAL-DIAMOND FIBRE

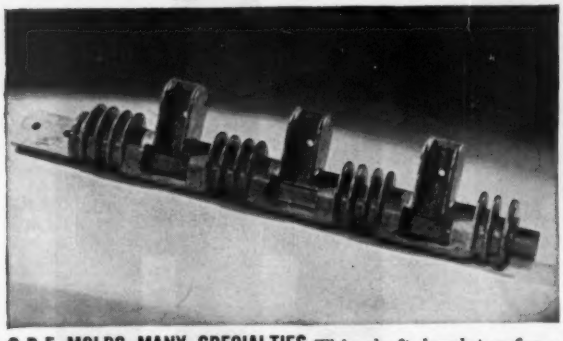
A SUBSIDIARY OF THE Budd COMPANY • NEWARK 15, DEL.



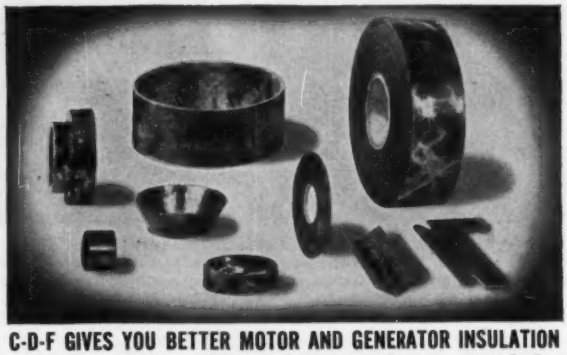
C-D-F MAKES FLEXIBLE INSULATION To meet critical high heat and electrical insulating needs, C-D-F makes these efficient, easy-to-apply tapes. Size range is wide, with latest resins and backing materials used. Write for samples and technical bulletins of Silicone, Teflon, and Micabond tapes.



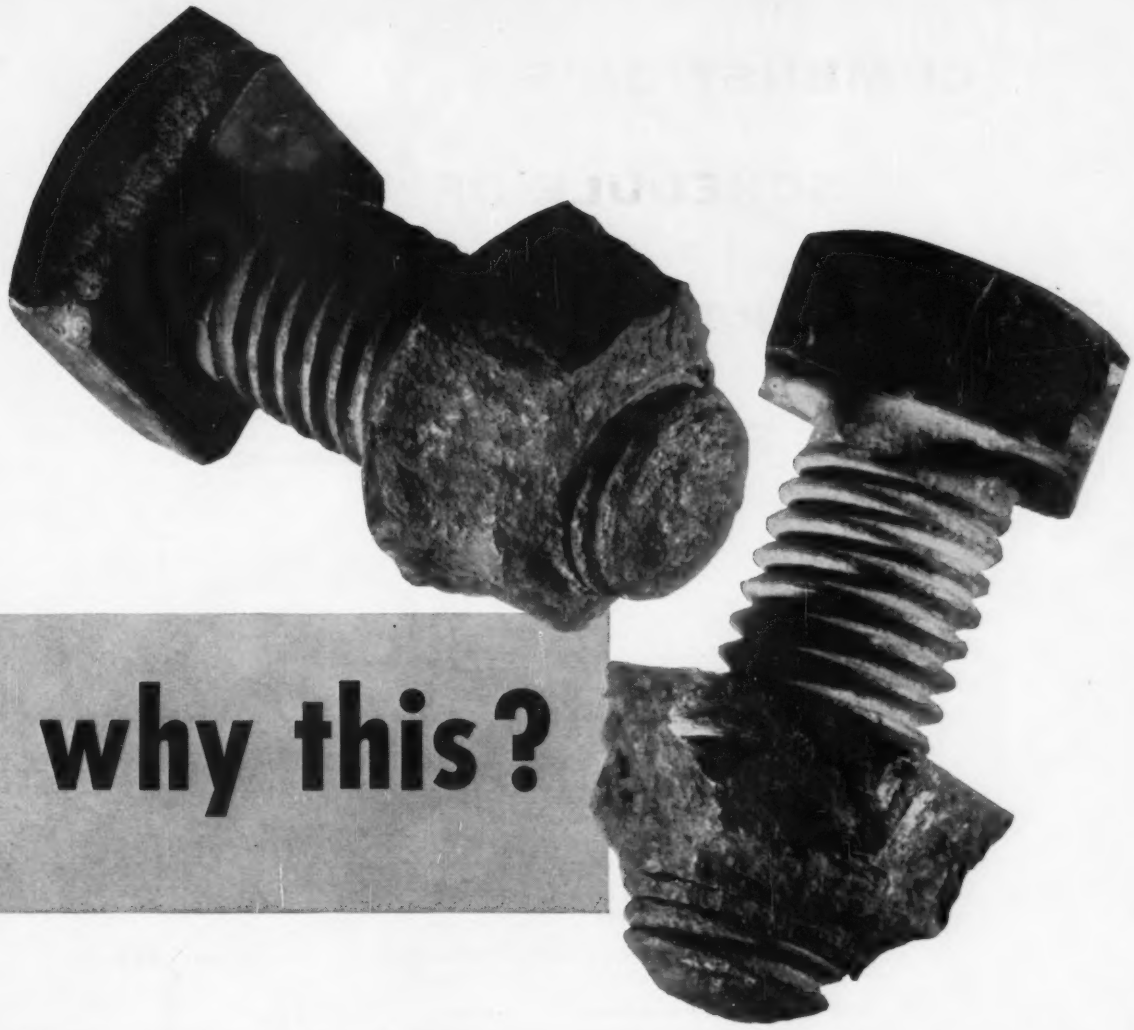
C-D-F UNDERSTANDS THE ELECTRICAL INDUSTRY'S NEEDS Precisely machined to close tolerances, Dilecto panel boards guarantee dependable insulation, help designers save space. New 1955 Dilecto catalog is yours for the asking, lists all new grades.



C-D-F MOLDS MANY SPECIALTIES This shaft insulator for a circuit breaker is molded from C-D-F's cloth-based industrial thermosetting plastic, Celoron. Note complexity of mold, clean detailing. Celoron has high impact strength, is used in switchgear.



C-D-F GIVES YOU BETTER MOTOR AND GENERATOR INSULATION All these built-up and bonded mica products are made by C-D-F to provide uniform high-heat resistance and dielectric strength. All forms of Micabond are made for better performance and lower costs.



why this?

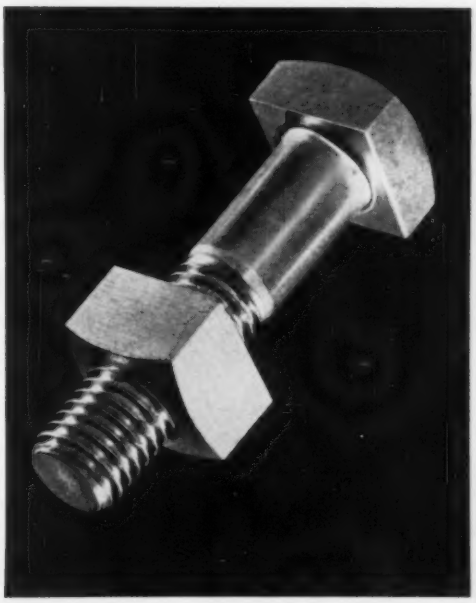
when new aluminum coating holds up so well

On galvanized structures, the rusting caused by atmospheric corrosion usually begins with the bolts and nuts. In time, this presents a serious maintenance problem. But now, at slight extra cost, you can obtain coated fasteners which are so rust-resistant that they outlast any other part of a galvanized structure. These fasteners are coated with Bethalume, Bethlehem's new aluminum coating.

The Bethalume hot-dip coating makes possible a much longer service life for fasteners by adding the corrosion resistance of aluminum to the strength of steel.

Bethalume coatings stand up especially well under "heat-corrosion," at lower cost than products customarily used. Moreover, the Bethalume coating is unusually uniform—not merely on the body of each bolt, but over the entire threaded portion as well, thus making possible threads which are clean and smooth-fitting.

We have a new illustrated booklet on the Bethalume coating, which describes its advantages in detail. If you would like to have a copy, just drop a line to the Bethlehem office nearest you.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

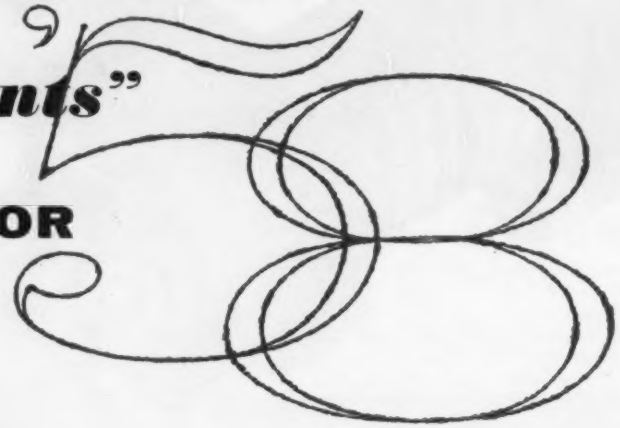
BETHLEHEM STEEL

COMBUSTION'S

SCHEDULE OF

"Main Events"

FOR



Dedication of World's Largest, Privately Owned, Integrated Facilities for Nuclear Research, Development and Manufacture

C-E's $15,000,000 Nuclear Division at Windsor, Connecticut. Ground broken December 1955; construction completed in late '57; dedication in Spring of '58.

Construction of Nuclear Submarine Prototype

At C-E Nuclear Division, Windsor, Connecticut. First nuclear submarine prototype to be designed and built at other than AEC-owned facilities.

Shipment of Largest and Most Complex Nuclear Vessel Built to Date

Reactor vessel for Enrico Fermi Nuclear Power Station.

Completion of Manufacture of World's Highest Pressure, Highest Temperature Boiler

5000 pounds per square inch; 1200 deg. Fahr.

Engineering and Partial Manufacture of World's Largest Boiler

First boiler ordered to serve a turbine generator with a capacity as high as 500,000 kw.

Completion of Installation of World's Highest Capacity, Highest Pressure, Highest Temperature Package Boilers

Two completely shop-assembled boilers, one with a capacity of 100,000 pounds of steam per hour, and one to operate at a pressure of 1800 pounds per square inch and 1050 deg. Fahr.

These are some of the achievements which will maintain Combustion's leadership in 1958 in its major field — the creation and building of advanced designs of equipment for the generation of power or heat from conventional or nuclear fuels.

And, in another significant area, Combustion expects to set a new record this year — *the largest volume of shipments and billings in its history.*

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

C-E

C-136

ALL TYPES OF STEAM-GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING EQUIPMENT; PRESSURE VESSELS; SOIL PIPE

- One single instrument with internal limit switches for limiting the range of operation.
- Positive assurance that limits are set on one of the designated operating points.
- Equipment need not be de-energized to adjust the limit levels.
- Raise and lower limits may be set independently.

LOAD RANGE SELECTOR

Supplied on Westinghouse single-phase, type URL and URF, feeder voltage regulators; on all standard three-phase type URS voltage regulators rated 750-kva and below.

I-70812

YOU CAN BE SURE... IF IT'S Westinghouse

Pennsylvania Transformer Introduces *the*

- **FASTER INTERRUPTING TIME**
  Recloser completely clears the line in just 2½ cycles —or twice as fast as the equivalent oil circuit breaker.
- **SAVES UP TO 25% IN COSTS**
  Pennsylvania Suburbanite Substation offers savings as high as 25% in initial costs, compared with other types of substations.
- **EASY TO INSTALL**
  Integral construction simplifies installation . . . keeps costs down.
- **FLEXIBLE IN DESIGN**
  May be supplied with either one or two circuits . . . and with LTC, metering equipment and fuses to meet individual requirements.
- **RECOMMENDED FOR SUBSTATIONS THROUGH 2500 KVA**

Pennsylvania's "Suburbanite" substation was designed specifically for less populated areas in which load conditions are such that relatively little capacity is required and economy is a major factor in the choice of substation equipment.

The Suburbanite provides the desired economy without sacrificing necessary efficiency and safety. It is a compact, easy-to-install substation that utilizes a recloser rather than an air or oil circuit breaker. Mounted in framework attached directly to the transformer, the completely automatic recloser clears the low voltage line in just 2½ cycles in the event of a fault.

Other equipment includes metering devices . . . load tap changing in the low voltage for plus or minus 10% regulation in 32 steps . . . high and low voltage lightning arresters...and high voltage fuses. High voltage lines can be brought directly from the customer's cutout switch (mounted on a nearby pole) to a dead-ending structure on the h.v. side of the transformer.

The Suburbanite saves as much as 25% in initial cost, compared with other types of substations. In many cases, savings also result from the simplicity and ease of installation, which requires a minimum of additional steel work.

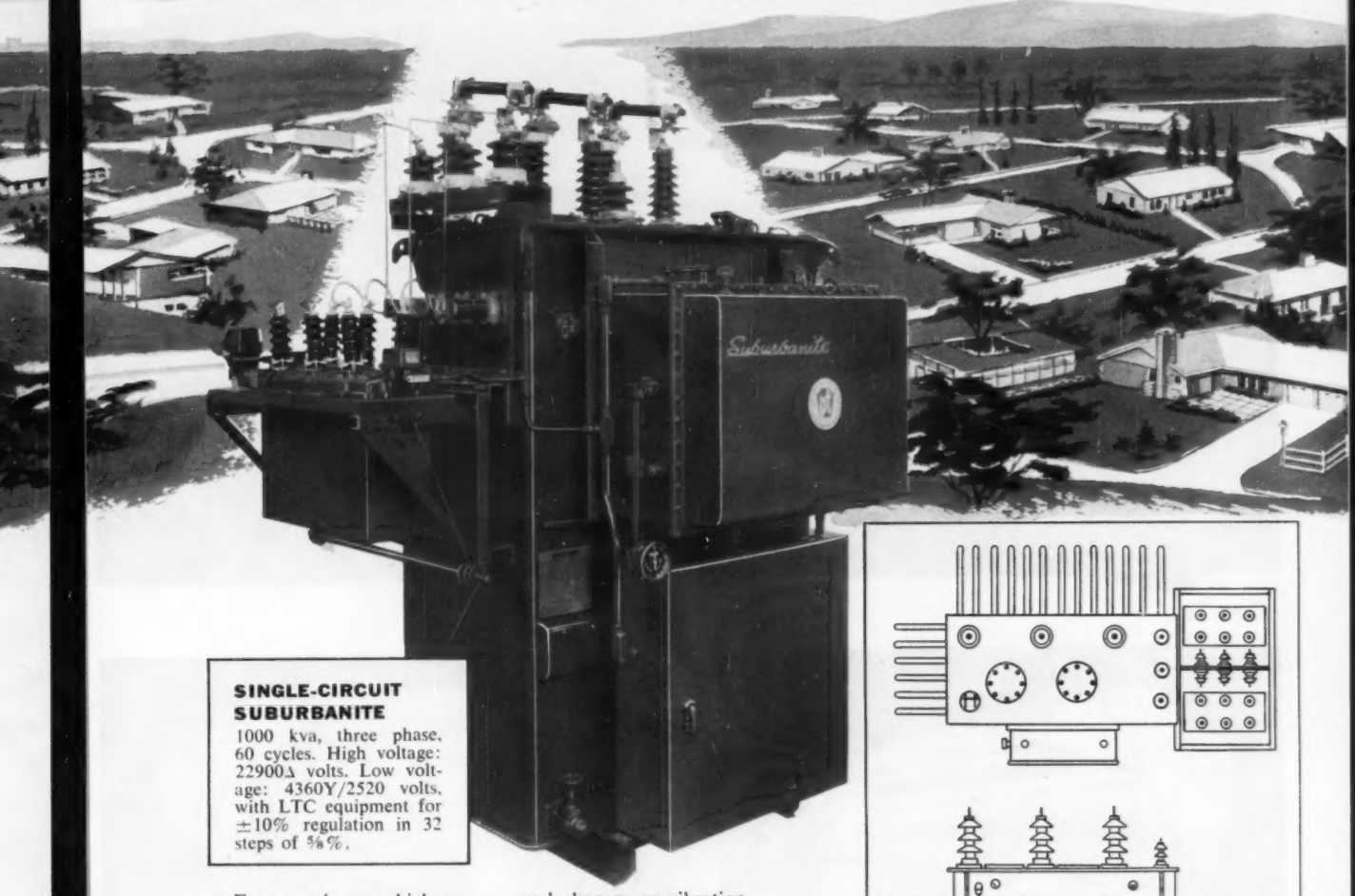
The Suburbanite is available with either one or two circuits . . . and can be tailor-designed to fit individual requirements regarding fuses, metering, and load tap changing. For information regarding a specific application, contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

PENNSYLVANIA TRANSFORMER — McGRAW EDISON

PENNSYLVANIA POWER

"Suburbanite"

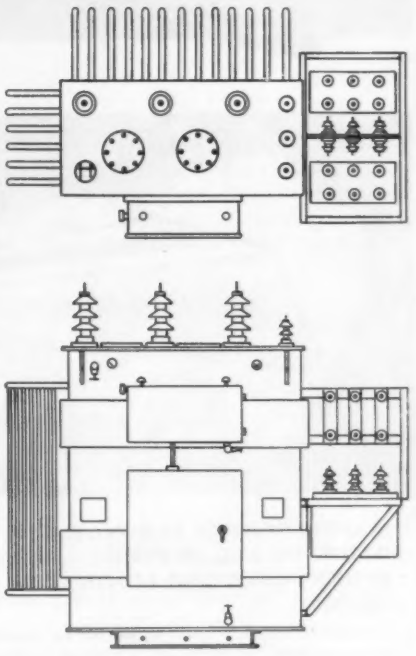
A Low-cost Substation for Rural Areas, Small Towns and Outlying Industrial Plants



SINGLE-CIRCUIT SUBURBANITE

1000 kva, three phase, 60 cycles. High voltage: 22900Δ volts. Low voltage: 4360Y/2520 volts, with LTC equipment for ±10% regulation in 32 steps of ⅝%.

- Framework on which recloser is mounted is attached directly to transformer. Shipped completely assembled.
- Built-in winch simplifies inspection and maintenance of recloser. Bottom section of recloser tank, with oil, can be lowered—while top section, with contacts exposed, remains bolted to framework.
- Flexible connectors between transformer l.v. bushings prevent strain from thermal changes or vibration.
- Hood of LTC compartment is hinged for easy access.
- Metering equipment is located in easy-to-reach cabinet.
- Sealed transformer tank is reinforced to protect against positive and negative operating pressures.
- Built-in dead-ending structure (not visible in photo) is provided on h.v. side.
- High voltage bushings equipped with fuses.



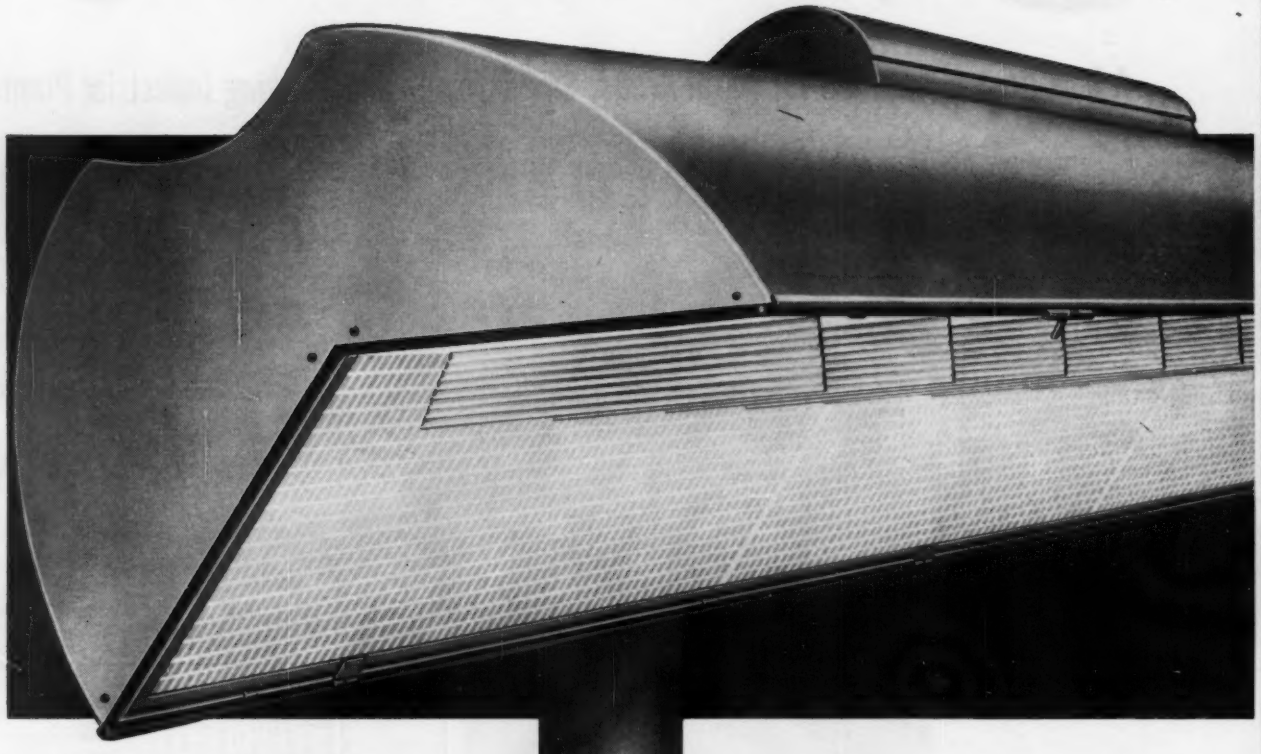
DUPLEX (Double-Circuit) SUBURBANITE

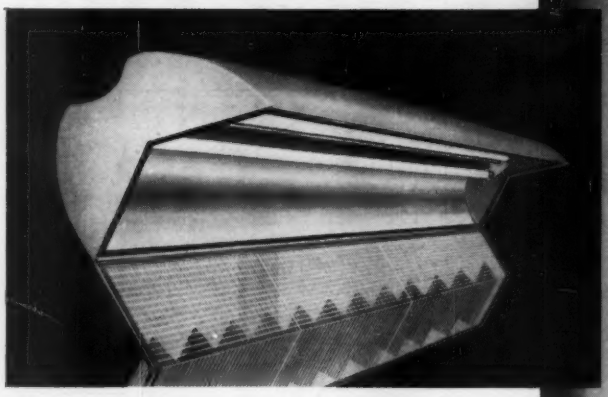
Includes two automatic reclosers mounted in frames attached to the l.v. side of the transformer. A fault in one l.v. circuit does not affect the other one.

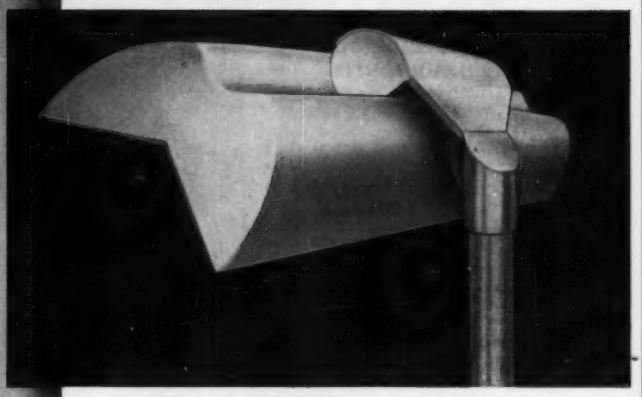
TRANSFORMERS

NEW MAINSTREETER

by Westinghouse







MAINSTREETER INNOVATIONS—GUIDE TO ALL FUTURE STREET-LIGHTING LUMINAIRE DESIGN:

Modern fiber-glass housing *cannot* be dented, is *corrosion-free*, never needs painting. Variety of heat-treated cast-aluminum brackets gives wide choice of mounting arrangements. Newly engineered reflectors of aluminized plastic have *exceptional* specularity! Exclusive acrylic refractor *controls* light *two* ways: interior lenses direct more than 50% greater light output onto the roadway; prismatic louvers direct light *again—further* shielding light from drivers' eyes! Sponge vinyl gasket eliminates moisture, bugs and dust; maintenance is negligible. Stainless-steel hardware retains "new" appearance. Remarkably improved ballast is easily accessible underneath "matching" cover in the support yoke, *eliminating* heat problems! "Universal" lampholders accommodate *all* rapid-start fluorescent lamps, including high-loaded lamps, giving MAINSTREETERS an almost limitless service-life! Simple switch of lamps and ballasts permits *any* circuit operation! J-04435

PARALLEL TO THE STREET! NO GLARE!

WHAT'S MORE—DELIVERS 50% MORE LIGHT TO THE ROADWAY

THAN ANY PREVIOUS FLUORESCENT LUMINAIRE!

Never before—street-lighting like this!

There is now a luminaire that provides faster, more *accurate* seeing—with *greater comfort for drivers!*—than any previous fluorescent street-lighting fixture ever developed! It is the striking new MAINSTREETER luminaire, created by Westinghouse. Moreover, MAINSTREETERS deliver efficiency of performance never achieved with fluorescent street-lighting before!

The sleek MAINSTREETER housing, of "indestructible" fiber-glass, mounts *close* to the pole and *parallel* to the street! So MAINSTREETERS avoid the cluttered daytime appearance of luminaires protruding out over the street. And the housing-ends of MAINSTREETERS—combined with special louvers on the refractor—completely shield drivers' eyes from nighttime glare of the lamps. Vision is unimpaired!

Cast-aluminum brackets provide adequate adjustment for levelling—plus the capability of tilting the luminaire for unusual applications. The entire unit is designed to give *ideal* light-distribution, conforming *exactly* to the street width!—providing *uniform* footcandle levels—and a definition of objects impossible in the past! With less distraction and better seeing by "everyone," accident rates will be still further reduced!

In addition, new DUAL optical systems PUT OVER 50% MORE LIGHT ON THE STREET!

The *entire* output of MAINSTREETER lamps is now controlled *two* ways! MAINSTREETER refractors have, *inside*, a pattern of countless prismatic lenses—directing *more* light, from contour-engineered reflectors, *specifically* down onto the street! Then, on the *outside*, twelve exclusive prismatic louvers *again* control this light—to achieve a new concept of street-lighting comfort! The result is *better than 50% more complete utilization of all light produced by the lamps!*

See, at left, all *eight additional* features of MAINSTREETER luminaires—*already establishing* all future street-lighting design! Nothing parallels MAINSTREETERS—parallel to the street!

Watch Westinghouse Achievements in Lighting

Orders Accepted Now!

Volume production of MAINSTREETERS already is underway! Traffic engineers "everywhere" proclaim the hope of vastly improved safety records. And this is the expectation of MAINSTREETER illumination! Call your near-by Westinghouse representative for preferred delivery list information TODAY. Or, write to Westinghouse Electric Corporation, LIGHTING DIVISION, Edgewater Park, Cleveland, Ohio, RIGHT AWAY!

YOU CAN BE SURE...IF IT'S

Westinghouse

New Products, New Services, New Facilities from REYNOLDS ALUMINUM

to serve the electrical industry from power source to end use

Today—Reynolds Aluminum is helping the electrical industry to generate and distribute the nation's most important source of energy—electrical power—to millions of users.

And, as the electrical industry advances and expands for *tomorrow's* ever growing needs of electrical power—*Reynolds advances with it.* Developing and planning new products—expanding plants and facilities—providing engineering and research services—all designed to help the electrical industry operate more efficiently, with greater economy—through aluminum.

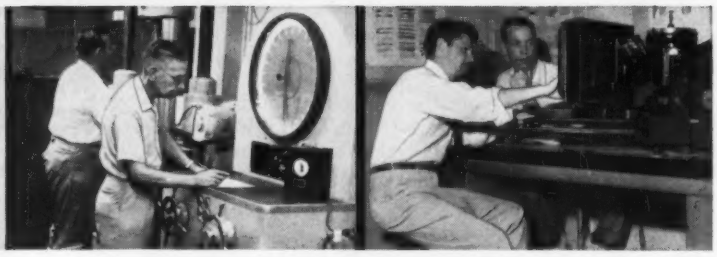
On these pages you'll see examples of Reynolds new product, service and facility developments for the electrical industry. These are just a few. For information on *all that's new for the electrical industry* from Reynolds Aluminum, contact your nearby Reynolds Office, your nearest Reynolds Electrical Distributor, or write *Reynolds Metals Co., P.O. Box 1800-EL, Louisville 1, Ky.*

Reynolds Engineering Service

Reynolds Engineering Service is ready to help you with any electrical problem. Reynolds engineers offer you a wealth of experience on the use of aluminum. And, they are available in your office, or in the field—wherever you need them to complement your engineering staff.

Reynolds Research

Reynolds expanded metallurgical research laboratories provide proving grounds for developing and testing new products and techniques for the uses of aluminum in the electrical industry. Here, Reynolds ideas such as Silver Plated Bus Bar and 5005 Alloy Conductor become realities after thorough examination.



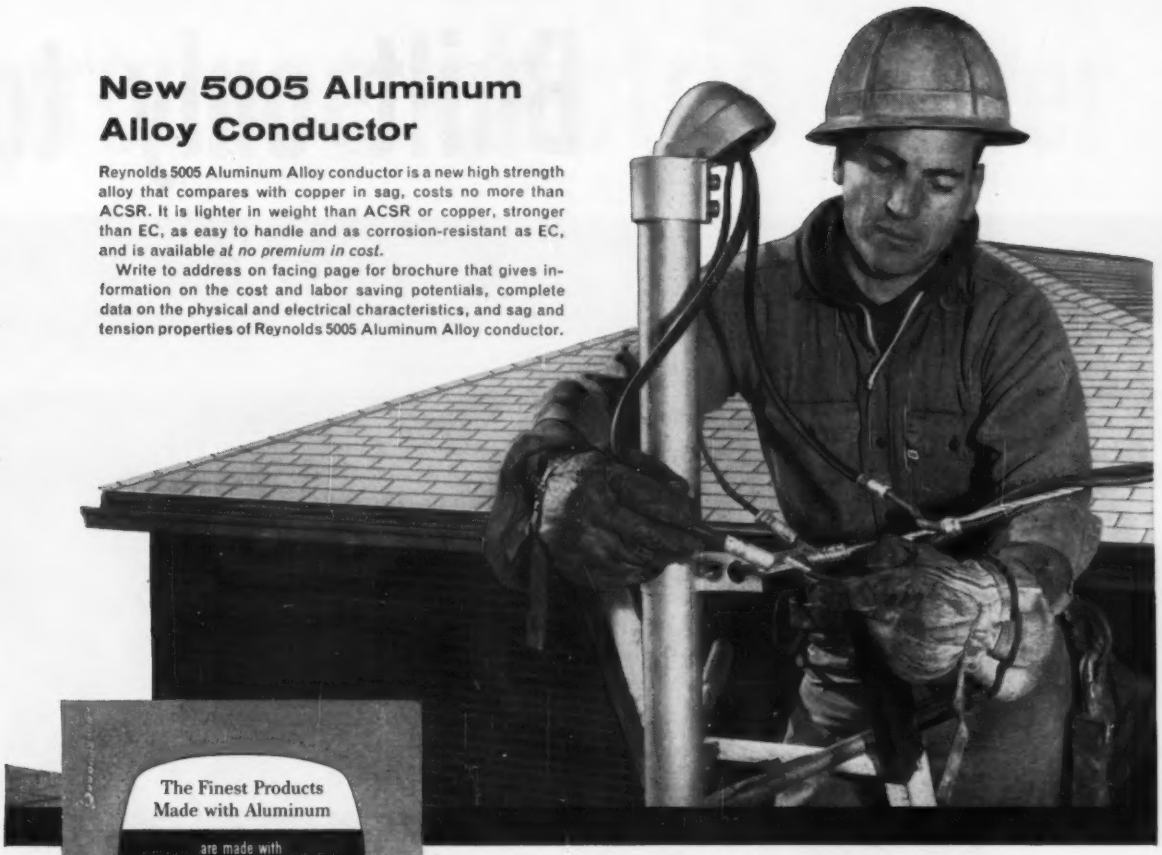
NATIONAL ELECTRICAL WEEK
FEB. 9-15, 1958

Watch Reynolds All Family Television Program, "DISNEYLAND," ABC-TV.

New 5005 Aluminum Alloy Conductor

Reynolds 5005 Aluminum Alloy conductor is a new high strength alloy that compares with copper in sag, costs no more than ACSR. It is lighter in weight than ACSR or copper, stronger than EC, as easy to handle and as corrosion-resistant as EC, and is available *at no premium in cost.*

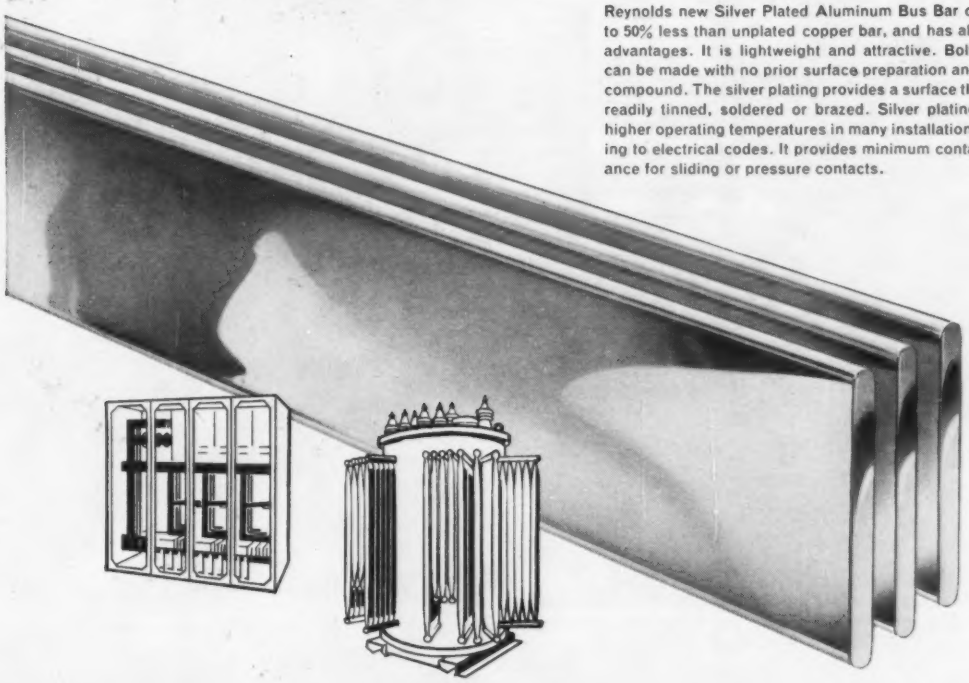
Write to address on facing page for brochure that gives information on the cost and labor saving potentials, complete data on the physical and electrical characteristics, and sag and tension properties of Reynolds 5005 Aluminum Alloy conductor.



The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

New Silver Plated Aluminum Bus Bar

Reynolds new Silver Plated Aluminum Bus Bar costs 35% to 50% less than unplated copper bar, and has all of these advantages. It is lightweight and attractive. Bolted joints can be made with no prior surface preparation and no joint compound. The silver plating provides a surface that can be readily tinned, soldered or brazed. Silver plating permits higher operating temperatures in many installations according to electrical codes. It provides minimum contact resistance for sliding or pressure contacts.



Built only to

produce electric power

The Diesel engine was first designed and built for mechanical drive. It was much later that Electro-Motive incorporated this principle in designing and building a prime mover specifically for electric power generation.

It was, in fact, in 1932 that two experimental electric power generating sets were tested at the Chicago Century of Progress Exposition. These two cycle engines were a revelation in design —compact and lightweight.

Refined and improved over the years, this advanced prime mover has been produced in quantity by Electro-Motive—enough, in fact, for a total generating capacity of more than 24,000,000 kw. Above all, this engine has proved its dependability, operating for thousands of hours under every conceivable condition with only the most routine type of servicing.

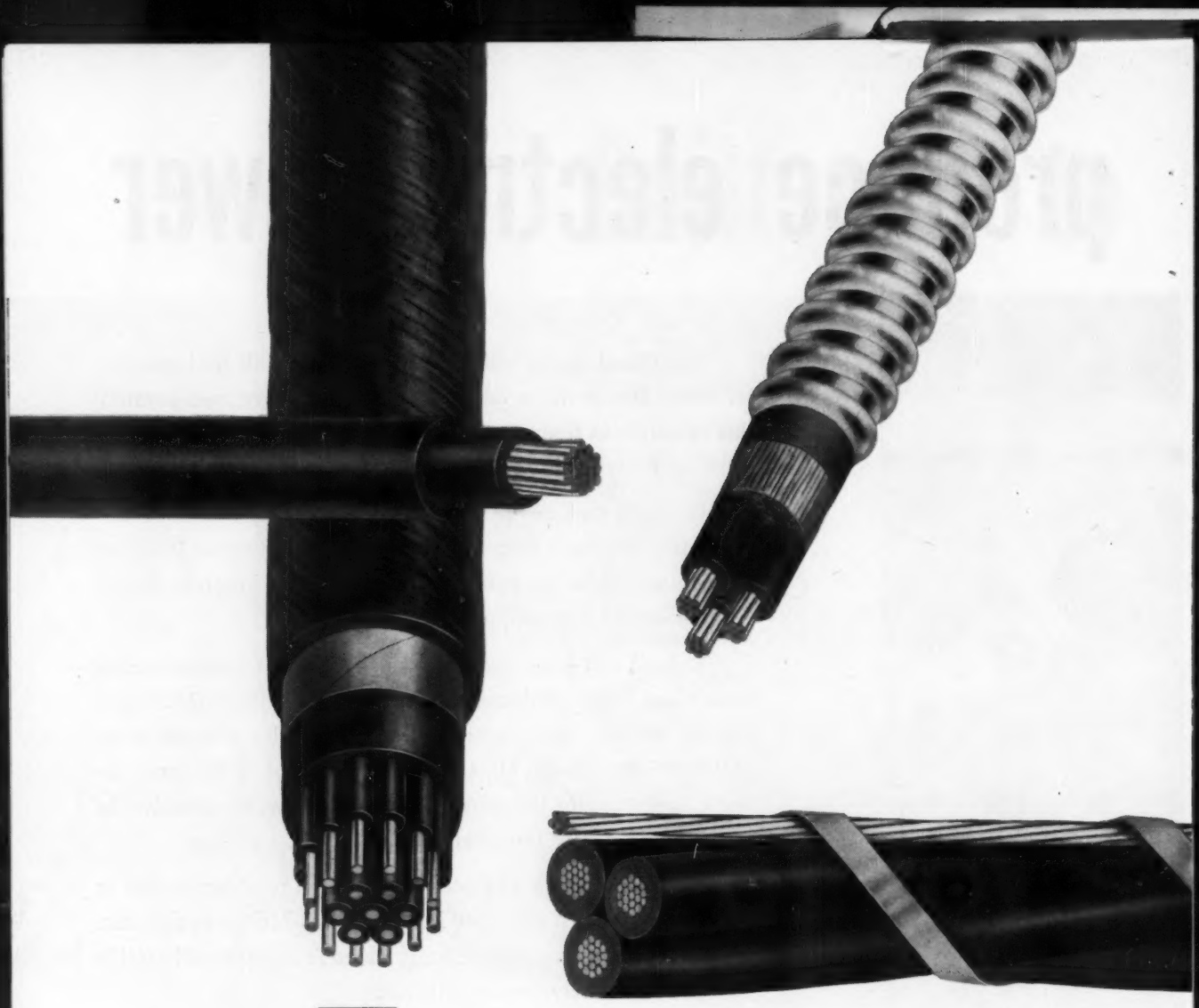
It is this wealth of tested and proven experience that is your best assurance when you install Electro-Mobile equipment. Why not discuss its potential for low load factor generation with your Electro-Motive representative?

1000 kw units for use on sidings or placed on piers for semi-permanent use.

500 kw units offer excellent mobility for many temporary applications.

LIVE BETTER ELECTRICALLY

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS
Sales offices in Chicago, New York, St. Louis, San Francisco
In Canada: General Motors Diesel Limited, London, Ontario



if *it's cable you need...*

—Kerite's the answer. For Kerite's wide range of cable types combines the latest techniques, materials and engineering with an insulation that is unsurpassed in its proven ability to serve reliably for years under the trying conditions of actual operation. Leading engineers will confirm this. We, too, would be pleased to tell you more.

Our headquarters office is at 30 Church St., New York 7, N. Y.
Branches are in Ardmore, Pa., Boston, Cleveland, Chicago,
Houston, San Francisco, Glendale, Cal.

KERITE CABLE

PIRI MEMBER

it's the **KERITE** *that makes the difference*

Editorial Comment

FEBRUARY 3, 1958

Spotlight on National Electrical Week—Feb. 9-15

Purpose of National Electrical Week to be observed Feb. 9-15 is to create a nationwide spotlight on the contributions of electricity and the electrical industry to our American economy and way of life.

It is a tribute to our industry that this observance will take many forms, for no other industry can claim such a diversity of contributions to our society and standard of living.

Our own utility industry, which is but a segment of the electrical industry, will support such activities as Science Youth Day, large electrical living exhibitions, vast promotional programs, along with plant tours and open houses.

In cooperation with trade allies and electrical manufacturers, the utilities will support a host of activities such as speeches, government proclamations, and advertising designed to focus public attention on National Electrical Week.

This observance offers a tremendous opportunity to stress the role of the industry in our society. As we participate in this annual event, we should be keenly aware of this opportunity. We should shoulder our full responsibility for making this and future observances truly worthy of the industry they represent.

Research Is The Responsibility of All

Continuing investigation of corona loss and of radio interference from extra high voltage transmission lines is a shining example of the kind of research being done today by electric utilities and manufacturers. It would be hard to find a better answer than this to those who claim that utilities are doing little to advance their own technology.

A recent issue carried a report on a new phase of these studies; the Leadville project. It involves an extra high voltage test line high in the Rocky Mountains near Leadville, Colorado. Here the Public Service Company of Colorado and associated companies will measure the effect of aging on corona loss and radio interference of different transmission conductor configurations and sizes under high altitude, severe weather but clean atmospheric conditions.

This knowledge will have immediate usefulness in designing long-distance, high-voltage circuits to carry power from the western slopes of the Rockies over the great divide at 10,000 to 12,000 ft and into the Denver area. But beyond that the Leadville data will clarify quantitative disagreement over the effect of altitude on corona and RI levels existing today.

The research projects, at Leadville and earlier at Tidd Station of AG&E stemmed from determined pursuit of problems by individual utilities. As a result of their enterprise the industry has and will benefit greatly. And it will benefit too from research in high voltage cable, aluminum connectors, the study of thermal characteristics of soil and similar studies now being conducted by the Edison Electric Institute, Association of Edison Illuminating Companies, American Institute of Electrical Engineers and others.

But just as all utilities will benefit from these studies, so it should be the responsibility of each to shoulder a fair share of the research burden by participating in industry programs and by individual pursuit of local research problems.

Atomic Progress

Fusion Tests Mark a Big Stride Toward

COLUMBUS II, largest controlled fusion machine opened to view at Los Alamos Atomic Lab, is ringed by capacitors. About 3-million deg Cent. was achieved

"THE PIT" is designed to hold heavier equipment of the U. S. Project Sherwood. It will be the underground chamber that confines radiation from future machines

Three main factors stand out in the joint U. S.-Britain announcements last week on controlled thermonuclear reaction progress:

- Temperatures achieved in experiments have been great enough to provide an insight into problems of making fusion practical.
- Stability of the reactions indicates that control of magnetic fields —one of the thornier problems—is soluble.
- There is reasonable certainty that reactions achieved to date have been thermonuclear.

Predictions put the day of practical application anywhere from 1968 to about 2000, depending on the scientist interviewed. The U. S. views the latest developments as "major steps forward," not "major breakthroughs," said Atomic Energy Commission Chairman Lewis Strauss. Practical application "is still a long way off," he said.

In Texas, Cautious Optimism

The announcements sparked interest in Texas. Eleven electric utility companies there are in the second year of a four-year, $10-million research program to explore controlled fusion reactions. The group is called Texas Atomic Energy Research Foundation. Its program contract with General Dynamics Corp's General Atomic division is the first large-scale private approach to the energy source.

Already 12 nuclear physicists are at work on the program. They have been joined by 12 other scientists who are specialists in fields bearing on the problem of controlling thermonuclear energy. Two buildings are under construction at the John Jay Hopkins Laboratory in San Diego where General Atomic's fusion research group will work.

H. R. Hallock, executive vice president of the foundation, said, "It is beyond anybody's ability to predict when the foundation's research may reach application."

Future plans for the research program will be discussed in San Diego next Monday, Hallock said.

Future's Power Supply

In San Diego a General Atomic division spokesman said, . . . "Our scientists were very pleased to read the publicly released information . . ." But achievement of controlled fusion for production of power is on the order of decades away, they believe.

Controlled fusion reaction is not one single theoretical, experimental or engineering problem, they pointed out, but instead is a host of problems in various fields. Quite possibly, some of the important questions have not even been asked as yet.

The four-year research program on which the Texas utilities and General Atomic are working brought this comment: "It is impossible at this point to know exactly what achievements will be made in that time and what new answers G. A. scientists might provide toward the harnessing of this unlimited energy source."

Britain's research team at Harwell was generally accorded the edge in experimental progress, despite the unanimity of the two announcements. Britain has concentrated practically all her effort on a method of transient heating in a gas discharge.

Working with Harwell apparatus costing about $840,000, she has only 13 scientists leading a 60-man team at the research center. This group is backed by a much smaller contingent at the Aldermaston establishments of the U. K. Atomic Energy Authority and Associated Electrical Industries, Ltd.

The U. S. is exploring the gas discharge approach at Los Alamos, N. M. Also under study are methods employing particle accelerators and the use of shock waves generated chemically.

Largest of the machines made public in the Los Alamos Project Sherwood is Columbus II. Here's how it works:

Power of 1-million amp is shot into the deuterium-filled tube at the heart of the machine from surrounding electric capacitors. The burst of energy is shot into the 10 x 30 cm tube at 60 kv at one two-millionth of a second. The charge "squeezes" the tube's heavy hydrogen into a thin column.

"DOUGHNUT" of quartz or glass is heart of Los Alamos "perhapsitron"

A heavy magnetic field is created which crushes the hydrogen gas under about 40,000 psi at some 3 million deg centigrade. This causes some heavy hydrogen particles to fuse. In some cases, the heavy hydrogen or deuterium (H2) becomes helium (He3) plus an extra nucleus and energy. Other H_2 particles become tritium (H3) plus an extra proton and energy.

The aim, simply, is to produce enough energy to keep the machine self sustaining and have some left over for commercial application.

States Can Bird-Dog Atom Developments

State agencies and local governments have sufficient legal jurisdiction to enforce safe development of privately owned U. S. nuclear energy facilities. But they need coordination and dissemination of uniform regulatory patterns to encourage greater application of the atom.

How to attain this uniformity test within states and nationally was tackled during an informal meeting of state, local, and industry representatives sponsored by Atomic Industrial Forum, New York, Jan. 21.

Almost all state health, labor, regulatory, conservation, and other agencies have jurisdictional powers which can be extended to cover nuclear energy facilities, said W. A. McAdams, General Electric Co. When local ordinances and codes are added to these powers, there is a basis for regulating almost "anything, anywhere, at any time." But two decisions must be made:

- What authority is available and how it might have to be modified to cover nuclear installations?
- Who shall coordinate these modifications so uniform patterns of regulation will emerge within and among states?

To help make these decisions, said McAdams, the American Standards Association's N-2 committee is working on standards for collecting and reporting radiation exposure, proficiency in nuclear fields, and model legislation.

There is no need for states to set up separate atomic energy agencies, said Frank Norton, chairman, Texas Committee on Atomic Energy.

Norton recommended that the Forum, in co-sponsorship with a group like the Council of State Governments, plan a meeting aimed at coordinating and bringing uniformity to regulatory patterns, standards and codes within and among states. Representatives of national associations, state agencies interested in nuclear energy, public health officers, municipalities, and state coordinators should be invited. Such a meeting could serve as a springboard for clarification of relations between federal agencies—AEC, ICC, and Public Health Service—and their state counterparts.

Utilities Eye Ohio Ruling Warily

Can a city use police powers to force transmission lines underground? Cleveland Illuminating will find out soon

A hearing that carries strong significance for Ohio electric utility companies recessed last fortnight in Cleveland.

The case is the first test in Ohio courts of the extent to which a municipality, by calling on its police powers, may require an electric utility to construct transmission lines underground rather than overhead.

A decision on the controversy is expected about mid-March.

In the hearings, Cleveland Electric Illuminating Co asked that the city of Euclid be required to issue a permit for CEI to cross over six Euclid streets with a 132-kv line.

The company contends it has the unqualified right to build the double-circuit, steel tower line as granted in a franchise ordinance passed by the city in 1906. The franchise permits CEI to erect and maintain "poles, wires, conduits and such other fixtures . . . overhead and underground, as may be deemed by the company necessary or essential . . ."

However, an ordinance passed last March requires any line carrying 33-kv or more to be installed underground, and that construction permits must be obtained from the city council. The company attacked the measure as unreasonable, arbitrary, and whimsical.

The tower line would run 7.5 miles of which 3.75 miles lie within Euclid's limits.

If an adverse ruling in the case brings about widespread insistence by other cities that lines be placed underground, electric rates would go up "out of step and out of context with the environment," CEI said.

This could throw the whole economy of the northeastern Ohio industrial area into an imbalance, jeopardizing the competitive position of the area as a site for industrial growth, the utility counsel said.

The Euclid council last summer turned down permission for the utility to build the tower line. At the hearing the city gave these reasons:

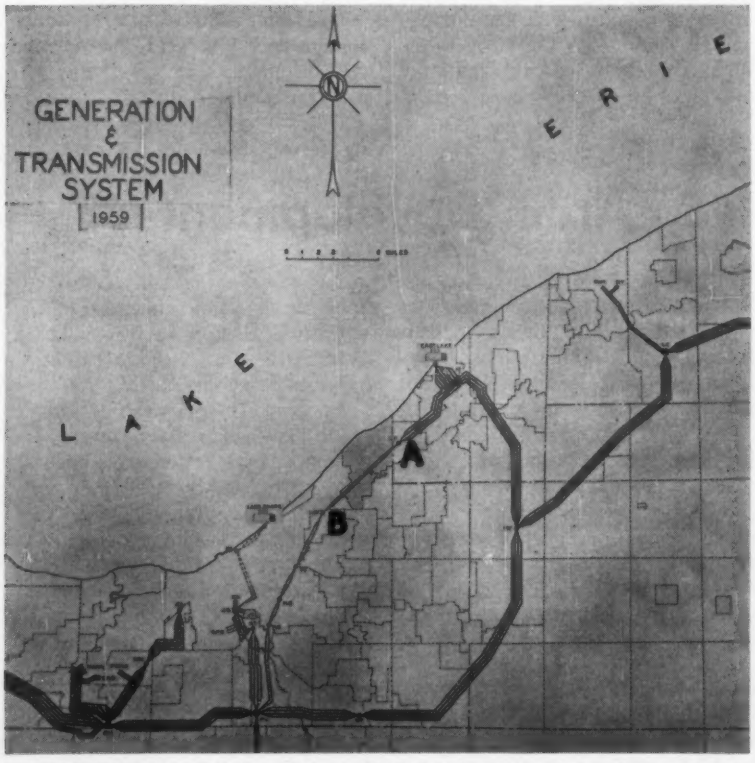
- Overhead construction of high tension wires endanger public safety.
- It reduces real estate values and cuts tax revenues.
- It would lower Ohio Inspection Bureau's fire insurance classification of the city.
- It interferes with radio-TV reception.

CEI pointed out in its testimony that the underground line would cost nearly $4.5 million compared with about $1 million for overhead. The company has asked that Euclid be required to issue the overhead permit on grounds that:

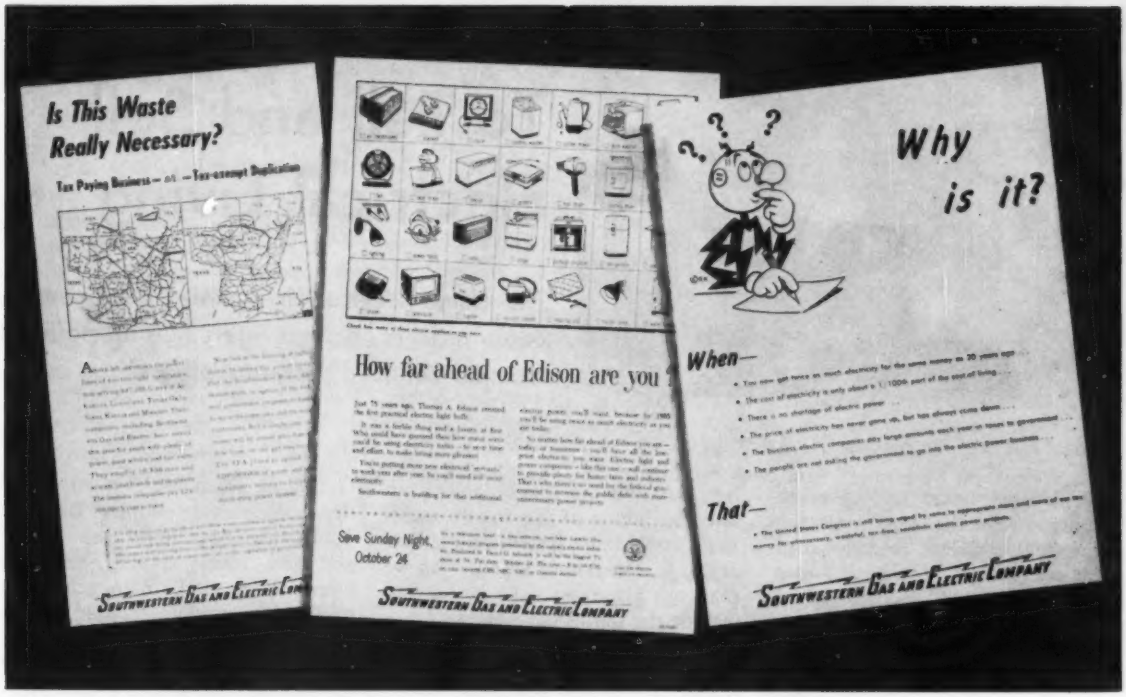
- The installation would have "no relationship to the peace, health, safety and welfare" of citizens.
- The company was granted the right to put up overhead lines by the 1906 ordinance, which is still in force.
- The right to require underground lines is reserved by the state and cannot be assumed by a city.
- The city's 1956-57 ordinances requiring that a permit be issued by the city council for construction of power lines of more than 33 kv are "unreasonable and whimsical."
- Denial of the permit would force a non-productive investment necessitating higher rates.

CEI has encountered difficulty with proposed transmission lines in another Cleveland suburb—Independence—and in the company's headquarter city.

Said John Lansdale, the utility's chief counsel in the case: "If underground installation is adopted as a principle throughout Greater Cleveland we'll have to spend ten times as much as we would for overhead lines."



CONTROVERSIAL LINE (A to B) is needed link for transmission loop tieing in Eastlake plant. Denial of overhead permit will necessitate higher rates, CEI says.



Ad costs, which were disallowed for tax purposes, brings first . . .

Court Suit Tests IRS Ruling

The first court challenge of the Internal Revenue ban on political advertising expense as a cost of doing business has developed in Shreveport, La.

Southwestern Gas & Electric Co, a utility which has aggressively fought government competition, has taken federal court action to recover a portion of its 1947-50 income taxes. The taxes were collected illegally because certain ad costs were disallowed for income tax purposes, the company alleges.

Southwestern G&E says the institutional ads were directed at the threat to the public welfare by further encroachment of the government in the company's service area. Target for much of the disputed advertising was the threat of expansion by Southwestern Power Administration.

Washington sources say that a ruling has gone out to IRS regional and district directors to disallow the anti-federal and political ad expense. No announcement was made in the capital because of the long-standing policy of not releasing information on individual taxpayer situations.

With such ads disallowed, investor-owned companies must pay for them out of profits, rather than deducting the cost of the ads from their income as they do other costs of doing business.

Suit Charges Duplication

Southwestern G&E contends in its suit that construction of certain government transmission lines and other facilities duplicated SG&E and other investor-owned company lines.

"Therefore," the complaint says, "the government agency projects were wasteful and unnecessary. The competition from government agency power facilities is unfair because these projects are exempt from federal taxation, are built with federal funds, or have the advantage of low interest rates from government loans."

This type of competition is "a threat to the plaintiff's business and property," the complaint says. The disputed advertising was "for the purpose of informing the public and for the information of the company's customers . . . (and) a necessary step in the protection of its business."

The disallowed ads ran in newspapers and magazines from 1947 through 1950. Similar ads have been disallowed since then on grounds that they weren't "trade advertising." SG&E's suit, though, covers just the four-year period.

The suit alleges a total of $49,030 was wrongfully disallowed. Of this, $23,309 was for advertising. The company seeks a total judgment of $20,664 for income tax and interest, which is the excess payment for the four years because of what SG&E charges are improper disallowances. The suit also covers some legal, traveling, and miscellaneous costs.

The suit follows a December Wisconsin PSC decision prohibiting inclusion of "public ownership" ads as an operating expense.

SG&E says it intends to carry the case to higher courts if necessary.

Gals Learn How To Tell and Sell Electrical Living

The home service girl—genie, saleswoman, cook, teacher, actress—gets helpful pointers from Ed Vennard (left) and others

"You—the home service representatives—are the most important group of employees in your company today—but only if you literally see the whole picture—eliminate myopia."

This challenge came from Robert L. Coe, Union Electric Co's residential sales manager, who keynoted the recent second annual Live Better Electrically Women's Conference in Chicago.

Developed along the theme of "How to Tell the Story of Electrical Living," the meeting attracted almost 300 women with careers in the home service field. It was aimed primarily at aiding utility home service representatives in improving their communications and presentation techniques to help sell themselves, their companies, and electric living.

The program, led by experts in their respective fields, placed strong emphasis on the proper use of mass media and the advantages of using slides and films in presentations.

What Top-Notch Gals Must Know

In urging the gals to see the whole picture, Coe pointed out that today, a top-notch home service director must not only know current trends in homemaking and mass education techniques. She must also "know and understand the plans, programs, and activities of the electrical industry," including her company's residential sales team, EEI committees, appliance manufacturers and related organizations, women's magazines and industry publications, and specific industry sponsored programs.

To meet today's keen competition not only for the family dollar but also the minds of the family members, Assistant Extension Editor Jessie E. Heathman urged: "As we plan our programs, let's be sure to include the individual—the target—in our planning. It is important to have their minds, as well as their (radio or TV) sets turned on."

The importance of taking the bold approach to communications was emphasized by Dwight R. Anneaux of Whirlpool. "If you want good communications, you not only have to listen to what people say but also interpret what they say." In this way, he said, "we can continue to promote and sell our products and successfully introduce new ones. . . ."

In selling electrical living, the home service gal has many advantages over her sales allies in talking to the housewife, the person who chooses and uses the appliance. This tack was taken by Edwin Vennard, EEI's vice president and managing director. "You work personally with the housewife" and act as "the genie who can solve all her electricity problems with efficiency and know-how. Best of all, because you are a woman talking with another woman, an alliance springs forth immediately, making sales resistance a minor encounter, and she is confident that you know and can fully understand her problems and her needs. . . . How rapid company growth will be depends to a large extent on the effectiveness of home service," he added.

To get rid of the "thorns in the rosy picture" of rising appliance sales (service problems, lack of instruction on operating appliances, poor installation, etc) Glenna McGinnis of Woman's Day suggested that home service people: "Be more numerous; accentuate the 'home' and give more 'service'; get into homes more; make management in your company increase your department's staff and dough; know more than you ever knew before; and know your prospects."

'Watch Teen, Farm Markets'

Turning to one of these prospects, the farm family, Julia Kiene of Capper's Farmer said, "Few of us realize the potentials of the farm market for electric appliances and a bouncing meter. . . . The U. S. Agriculture Dept states electric equipment in farm homes in the next ten years will amount to $11 billion."

Teen-agers are the "fastest-growing segment of your market" and have an "important voice in the purchase of electric appliances in the home", said Sigana Earle of Seventeen Magazine. Yet this group, despite advertisements and the appliances they had seen in stores and at home, thought appliances "difficult and complex to use; some were actually afraid to use them," she reported.

Wrapping up the conference, Metropolitan Edison's T. O. McQuiston told the women to face their challenge. "We can capture the imagination of the public by continually introducing in dramatic fashion the parade of new electrical devices for the home. It represents a challenge to the home economist to broaden the scope of her operation—because she is the creator of new markets. She is the link between the product development and the public acceptance . . ."

December Peak Up 5%

The peak load in December topped the 1956 peak by nearly 5%, according to an Edison Electric Institute survey. Utilities representing more than 98% of the industry reported a peak of 107-million kw. The year-end figure barely topped the '57 summer peak of 106.7-million kw.

Based on an Electrical World survey of about 74% of the industry, a winter peak of 105.3-million kw was estimated (EW, Jan. 13, p 44).

The December peak was 4.6% below a forecast made last October. Mild weather and slower industrial activity kept demands below expectations, EEI said.

A 22.2% gross margin of generating capability was reported over the December peak demand. In 1957 about 8-million kw of new capacity went on the line, the report said. In 1958 about 16½-million kw will go into operation.

High Dam and 'High Order'

The Oregon Water Resources Board last Monday urged Congressional approval of funds for Interior Department study of a high Pleasant Valley Dam. The recommendation came in a report on a Middle Snake River study.

The report asked Federal Power Commission to suspend any portion of license to Idaho Power Co's Brownlee, Oxbow, and low Hells Canyon dams that would interfere with maximum economic development of high Pleasant Valley "or other projects of higher order of development in this reach of the river."

The high Pleasant Valley Dam would back water to the tailrace of Idaho Power's Brownlee and flood out the Hells Canyon and Oxbow sites.

Meanwhile, National Hells Canyon Assn has urged that federal government buy Brownlee Dam when it's completed by Idaho Power, then operate it as a federal project during ten-year construction period of a U. S. high Hells Canyon Dam.

Strike While Iron's Hot . . .

Wall Street observers say electric utilities should bring to market as promptly as possible all funded debt offerings whose proceeds will be needed in the near future. Their reasoning is this:

Most predictions for 1958 are for lower yields on new bond offerings. For example, the 3.81% yield basis at which West Texas Utilities Co bonds were marketed Jan. 22 is more than 1¼% below yields on similar securities of only about three months ago.

There's a cloud on the long-term money cost horizon. That is the probability of the Treasury funding a portion of its short term debt into long term bonds. It was an announcement of such a forthcoming federal funding operation which touched off the debacle in the bond market in the spring of 1953, Wall Streeters note. Then, the yields on new bonds of electric utilities rose more than 1% per annum in a few months.

$11-Million Loan Approved

Rural Electrification Administration has approved an $11.8-million loan to the Central Electric Power Co-operative of Jefferson City, Mo. The money will be used for additional generating and transmission facilities to furnish power to 17 co-ops serving 100,000 farmers in central and southcentral portions of the state.

'Ready, Able and Willing . . .'

A new wood chip plant outside Jackson, Miss., will be served by Mississippi Power & Light Co, the State PSC ruled recently. MP&L is now "ready, able and willing" to serve the plant, the commission said. Capital Power Association, an REA co-op which operates in the area, does not have adequate facilities to "efficiently serve" the wood chip plant, the PSC added.

Capital had argued that the plant is located in its "grandfather" territory under a 1956 public utilities regulatory act. The act guarantees all utilities territories they served at the time the law was passed, but empowers the PSC to rule on any extensions of service.

Streamflow on the Rise

Bonneville Power Administration restored 180 Mw of interruptible power Jan. 17 for use by industries dependent upon non-firm power. Warm weather, which cut system loads as much as 270 Mw below estimates, and above-average rainfall brought the restoration. Streamflow of all major power streams in the Pacific Northwest were on the rise.

A general business slow-down, warm weather, and cutbacks by aluminum and other non-ferrous metals producers accounts for recent drop of about 5% in Northwest power demand. BPA studies of probable streamflow forecasts indicate the western group of utilities in the Pacific Northwest power pool can serve all area firm and non-firm loads on hydro resources through April 15.

ELECTRIC HOME HEATING was brought to the 1957 Home Show Exposition by a special display booth which exhibited the campaign slogans used by the utility in its continuing promotions and showed models of the heating equipment

Three-Year Electric Heating

IP&L 1954-57 campaign reaches homes, builders, equipment manufacturers, trade allies and will continue through 1958

Three years of specialized electric heating promotions by Indianapolis Power & Light Co are paying off today.

During 1954-56, the formative years, promotions aimed at a planned, slow buildup, reaching a high point in 1956. These promotions also set the stage for the all-out campaign in 1957. Here's what was accomplished:

The public, the customers, were the first to be wooed. IP&L did this through a series of 12 open houses which featured the various kinds of electric resistance heating and heat pumps. The utility estimates that, all told, 125,000 people went through them. Proportionally, their responses were even greater.

Besides seizing the customers' attention, the open houses served another purpose. They captured the interest of architects, builders, and manufacturers. They also perked up the IP&L sales staff.

These open houses dramatized certain problems, particularly those involving equipment installation and house insulation. Here the company staff pitched in, experimented, and consulted until workable solutions were evolved.

Selling a New Living Concept

There was another exciting development: Before long IP&L found itself in the real estate business. In effect, it was selling a whole new concept of modern living. In a single electrical package, it was selling comfort, convenience, cleanliness, along with electrical heating. This concept, couched in terms of greater profits, better employee morale, and increased efficiency, went over well with commercial and industrial customers.

Very early in the campaign, IP&L recognized that to make electric heating a "going" thing, it would have to protect the infant business and its own stake in it by insuring that heating jobs going on the line were well engineered and installed.

The company began by revamping its own internal organization. Two electric heating sections were set up, one dealing with residential and the other with commercial and industrial customers. The functions of these sections included:

- Developing close liaison among builders, electrical contractors, insulation people, equipment manufacturers, and financing agencies.
- Determining the best method of electric heating for each customer.
- Assisting in the engineering and the sales approach to the customer.
- Inspecting jobs to make sure that they were what the company prescribed.
- Training its own people in the engineering and economics of electric heating.

BUS CARDS, used effectively inside and outside Indianapolis transportation units, stressed automatic control features and convenience of electric home heating

Drive Pays Off

• Developing effective sales aids.

The company then turned to its sales allies to insure that:

• Participating manufacturers were helping with their sales and service facilities.

• Promotions by trade allies were coordinated for hammering away on the same theme at the same time.

IP&L took these steps to speed the program:

• It offered a new 1.7¢ rate where the primary source of heating was electrical.

• It offered budget billing.

• It participated aggressively in trade shows and fairs.

• It sponsored closed-circuit telecasts.

• It sponsored the 1957 General Electric Live Better Electrically Caravan, of which one featured display stressed the heat pump.

• It established special standards of insulation.

• It set up a special "6-4-2" insulation display, telling the public the advantages of 6 in. of insulation in ceilings, 4 in. in walls, and 2 in. under floors over unheated spaces.

• It assembled a testimonial file of satisfied users, and based its promotional material on what users said about electric heating.

• It approached trade allies through special mailings.

• It sent special mailings to commercial customers, emphasizing the advantages of air conditioning and the heat pump.

• It created special displays at its Electric Living Center.

• It organized heat-pump "clinics" for architects and consulting engineers.

• It launched a barrage of press releases and press parties which resulted in considerable editorial treatment of electric heating and heat pumps.

• It offered sales training courses for trade groups.

• It instituted a continuing-contact program with banks and other lending agencies.

• It put out special mailings to builders, urging them to have electrically heated homes in Indiana's famous "Parade of Homes."

IP&L developed a consumer campaign which ran from March through November, 1957. This campaign brought the electric heating story to the consumer, thereby creating the climate for selling to builders and realtors. And IP&L pledged support to builders, manufacturers, and other trade allies. It used saturation coverage in newspapers, and on radio, television, bus cards, and billboards, and special tie-in ads and promotion to project builders.

How have these three years of promotion paid off?

Briefly, almost 400 new electrically heated homes and 100 commercial-industrial installations were on the lines at the end of 1956. In 1957, called the "year of acceleration," the pace was quickened to where 240 homes and 39 commercial installations were added. According to estimates, IP&L expects to put in another 760 homes and 135 commercial jobs in 1958.

What does this mean in new load?

IP&L says 5,609 kw, and perhaps another 13,800 kw to be added in the coming year.

Results of IP&L Electric Heating Campaigns

Residential *	
Resistance heating installed	295
Resistance heating to be installed	50
Heat pumps installed	34
Commercial	
Heat pumps installed	62
Heat pumps to be installed	28

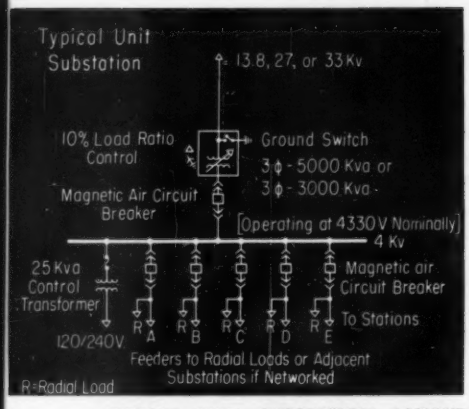
*Figures do not include additions of 300 houses to be built during 1957 and 1958 (Ridgewood Addition where electric heating only is offered)

DOUGLASTON SUBSTATION not only pleased area residents, but won prize. It was one of the first and more elaborate substation jobs done by Con Edison

Landscaped Win Suburban

Trees, shrubbery, lawns are used to blend unit station sites into residential surroundings in Con Edison areas

GEORGE METZ, Architectural Engineer, Mechanical Engineering Dept, Consolidated Edison Co of New York, Inc, New York, N. Y.



TYPICAL UNIT SUBSTATION LAYOUT has 33, 27, or 13.8 kv incoming feeder supplying a 3,000 or 5,000-kva transformer, station equipment, and outgoing 4-kv lines interconnected with other substations in the system

Landscaping obtains acceptance for Consolidated Edison Co of New York substations in residential communities and in some places even prizes from gardening associations.

When recent residential load increases made suburban stations necessary, the company faced a real problem of community relations. Of the two solutions available, landscaping appeared the more economical.

To landscaping the obvious alternative is the false-front substation building. But this solution has a high initial and a high maintenance cost, and the company feared the buildings might become neighborhood "haunted houses." They also aggravate the noise problem.

But a substation can be surrounded by attractive shrubbery, trees, and lawns that blend with those on adjacent properties. Transformers and switching equipment, when painted a forest green, become unobtrusive. The landscaping is designed by Con Edison architects, and the designs are submitted to city agencies for approval.

Stations are usually set in the center of large lawns and enclosed by evergreens for weather protection. Hemlocks obtain the immediate screen effects, and white pine and blue spruce add variety of texture and color. Low planting is done with laurel, andromeda, rhododendron and some purple barberry. Lawns are cut and weeded regularly, and shrubbery is replaced when necessary.

Con Edison's landscaping program has been so successful that the company's Douglaston station

AUBURNDALE SUBSTATION in marginal area has residences on two sides, commercial establishments on the others, yet harmonizes with both

Substations Acceptance

LAURELTON STATION, built on a triangular plot, is more recent. It replaces a trash dump used by local residents before the station was built

SIDE VIEW of Auburndale substation shows its curved driveway for vehicles. All service entrances to landscaped stations are in rear or at side

was awarded the "Plant America" plaque of the American Association of Nurserymen.

Careful design of all substation equipment and accessories has minimized the noise problem at these installations. The noise level compares favorably with 45 db normally produced in the reading room of New York's Public Library.

Since World War II, Con Edison has spent more than $93 million on substation construction, this figure including the costs of three bulk power substations as well as unit subs. The unit substation usually constructed has one or more 5,000-kva transformers, fed by a 33, 27, or 13.8-kv feeder with four or more outgoing feeders connected to the 4-kv bus. Magnetic air breakers in metal-clad outdoor-type cubicles do the 4-kv switching, and incoming and outgoing lines are usually underground.

Management Interest Sparks Top-Flight Safety

Four straight years of award-winning safety performance has placed Interstate Power Co among the leaders of accident prevention in the utility industry. It has won first place in the National Safety Council's Class C competition from 1953 through 1956.

Accident frequency rates for the period were 1.5 for 1953-54, 3.1 for 1955, and 1.5 for 1956. This compares with a rate above 16 in 1950 and 1951, and 8 in 1952. The frequency rate is the number of disabling injuries per million man-hours worked. For the electric industry, 1956 frequency rate was 6.84.

Participation of top executives in Interstate's program has evidently been a major factor. They provided the initial spark to set the program in motion and since that time have given it guidance and backing to make it effective.

In 1952, a new and unconventional safety book was prepared. It contains only 45 rules and is based on the premise that employees are human and can think.

No operating procedures are included in the book. Those problems are left to the operating department. As an example of this philosophy, the rule book says "wear goggles," but leaves it to operating to decide what kind.

The safety book was developed by a committee appointed by management, with the safety director as committee chairman. Only basic rules were laid down.

Executives approved the new safety rules. They let employees know that work was to be performed in accordance with the rules. Any employee who felt that working according to these rules was unnecessary was invited to resign because management felt a responsibility to see that work was performed safely.

The ground-to-ground rubber glove rule is one example of the type of rules in the book. If there is a reason for taking off gloves, the man comes down the pole. The rubber sleeve rule is also in the book on the basis that "experience has proved" its desirability.

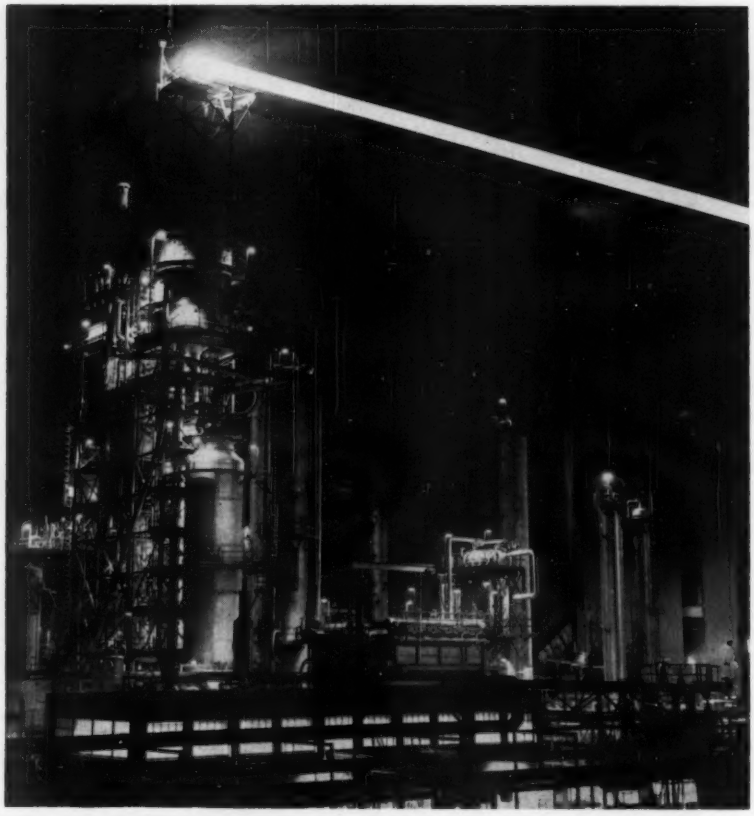
Analysis Goes Clear to Top

For every serious accident the district manager, the district operating superintendent, and the foreman involved are brought to the general office to explain to company executives, including the chairman of the board and president, why the accident occurred. Sometimes these calls are delayed to allow a little time for thought.

Accidents are reported monthly by districts. Colored dots and stars show the number of years each district has worked without a lost time injury.

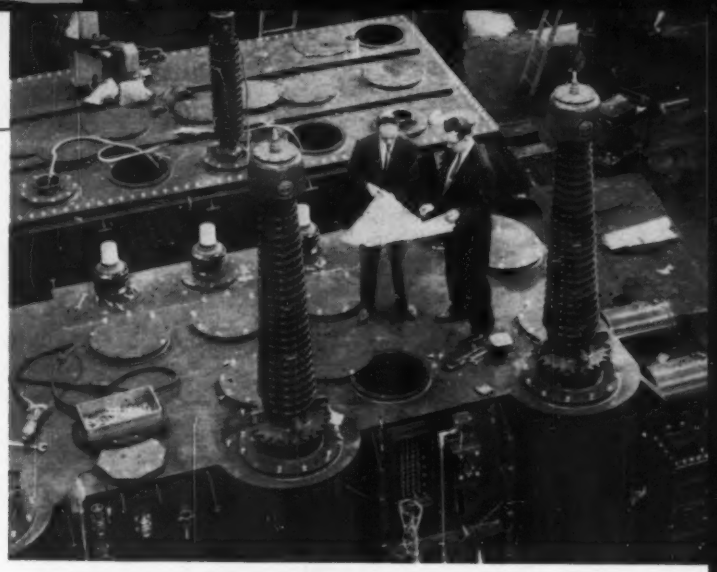
A number of individual awards have been made. On one occasion a fountain pen was awarded to each employee who had gone 10 years without any kind of an accident. Employees did not know they would get this award until it was presented. The surprise element was effective.

Most of the districts receive awards when another year is completed without a lost time injury. These consisted of dinners, mechanical pencils, and pens and wallets. There is no established procedure to be followed, and no promise to employees that they will receive any award.



Brightest Light Beams a Welcome

Bright beacons are coming into style. Big lights that beam a circling ray of welcome have been installed on New York City's Empire State Building and on Dallas, Tex., and Louisville, Ky., structures. Now comes an oil refinery beacon with a 2,500-w short-arc mercury-vapor discharge lamp. It is the world's brightest electrical light, says Wilshire Oil Co of California. The discharge lamp was made by Westinghouse Electric Corp.



Designers work within a limited range of optimum reactance because . . .

Impedance Sets Transformer Cost

Selection of impedance within optimum range results in lowest price. Higher cost of nonstandard impedance must be weighed against benefits to the power system

L. RABINS and **W. I. WHEELOCK**
Power Transformer Dept, General Electric Co, Pittsfield, Mass.

All power transformers have an optimum range of impedances, depending upon insulation class, which results in the lowest purchase price. Minimum manufacturing cost falls within this impedance range. The transformer designer can vary three fundamental electrical relations to get a balance between cost and impedance. Unfortunately, the designer's optimum range is narrower than the range of impedances from an application view. In many cases, higher or lower impedances may be required by system needs. Factors such as core saturation, shipping limitations, sound levels, and special requirements of the purchaser affect transformer impedance. Because impedances outside the optimum range increases the transformer's price, the purchaser should weigh this increase against the anticipated benefits in other parts of the system from use of a non-standard impedance transformer.

Because resistance in a power transformer is small, impedance can be considered equal to transformer reactance. From the designer's viewpoint, the economics of power transformer design are affected by three fundamental relations which determine transformer impedance:

1. Reactance varies inversely as the square of the volts-per-turn in the windings. The volts-per-turn determines the cross sectional area of the core.

2. Reactance varies inversely as the axial length of

How Reactances in Three-winding and Autotransformers Are Related

Reactance between windings

(H-X) High voltage-intermediate voltage
(X-Y) Intermediate voltage-low voltage*
(H-Y) High voltage-low voltage

Three-winding Transformers

(1) (X-Y) lies between (0.35 to 0.80) x (H-X)
(2) (H-Y) lies between (1.0 to 1.2) x (H-X) + (X-Y)

Autotransformers

(3) $R = \frac{\text{High voltage kv} - \text{Intermediate voltage kv}}{\text{High voltage kv}}$

(4) (H-X) = R x standard reactance for two-winding transformer

(5) (X-Y) lies between (0.35 to 0.80) x $\frac{(H\text{-}X)}{R^2}$

(6) (H-Y) = (H-X) + (X-Y) + (0.0 to 0.2) x $\frac{(H\text{-}X)}{R}$ + (X-Y) R

*For autotransformers, tertiary winding is taken as the low-voltage winding.

the coils. This length, plus the insulation distances at the ends of the coils, determines the length of the core leg.

3. Reactance varies directly with distance between windings and to a lesser degree with the radial buildup of the windings.

These relations apply specifically to a concentric-coil design. But the first and third can be applied to an interleaved-coil design, that is, a design in which the windings are alternating sections of high and low voltage interleaved along the length of the core leg.

The third relation is a direct result of insulation level. At the higher levels, the distance between windings is greater, and the most economical ractance increases with insulation level. Because a grounded-wye, high-voltage transformer has less insulation than a fully-insulated-neutral one, the former inherently has less impedance.

Each insulation level has an economical reactance range. To design a transformer with impedance higher or lower than the optimum value adds to the cost. A lower reactance gives a higher core loss but a lower total loss. A higher reactance results in a lower core loss, but a higher total loss so that the cost again increases due to the extra cooling equipment required.

Because the economics of power transformer design vary with costs of steel and copper, the optimum-cost design can have an impedance which varies within the impedance range. Present market prices of materials are such that the average optimum design has an impedance value near the low end of the range. Because losses and weights vary with transformer impedances, certain characteristics, such as low weight and low impedance, are incompatible. A low impedance invariably means a heavier transformer, and high impedance produces higher losses.

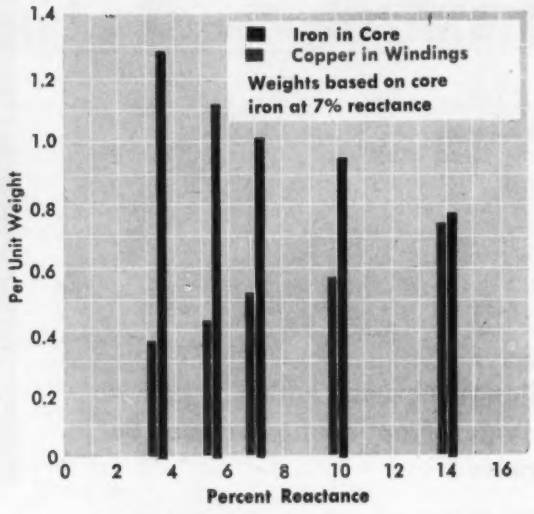


FIG 1—ACTIVE MATERIALS vary reactance, as shown by combinations for a 20-Mva, 3-phase, 350-kv BIL unit

Range of Economical Reactances

Winding BIL		Type of Cooling: OA, OA/FA, OA/FA/FA, OW % IZ				FOA, FOW % IZ			
		Ungrounded Neutral		Grounded Neutral		Grounded Neutral		Ungrounded Neutral	
HV	LV	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
150*	110*	5.0	6.25	—	—	8.25	10.5	—	—
200	110	5.5	7.0	—	—	9.0	12.0	—	—
250	150	5.75	7.5	—	—	9.5	12.75	—	—
350	200	6.25	8.5	—	—	10.25	14.25	—	—
450	200	6.75	9.5	6.0	8.75	11.25	15.75	10.0	14.5
550	200	7.25	10.75	6.5	9.75	12.0	18.0	10.75	16.5
650	200	7.75	11.75	7.0	10.75	12.75	19.5	11.75	18.0
750	250	8.0	12.75	7.5	11.5	13.5	21.25	12.5	19.25
825	250	8.5	13.5	7.75	12.0	14.75	22.5	13.0	20.0
900	250	—	—	8.25	12.5	—	—	13.75	21.0
1050	250	—	—	8.75	13.5	—	—	14.75	22.0
1175	250	—	—	9.25	14.0	—	—	15.5	23.0
1300	250	—	—	9.75	14.5	—	—	16.5	24.0
1425	250	—	—	10.25	15.0	—	—	17.0	25.0
1550	250	—	—	10.5	15.5	—	—	17.5	25.75

Reactances are positive sequence, for two-winding transformers. *Includes lower BIL's.

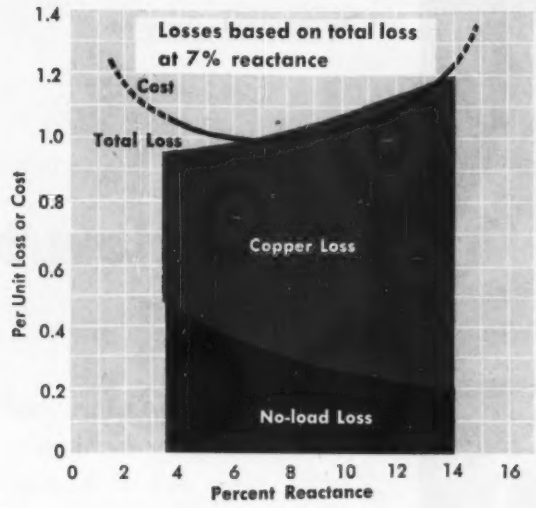


FIG 2—NO-LOAD AND COPPER LOSSES determine the most economical design in optimum reactance range

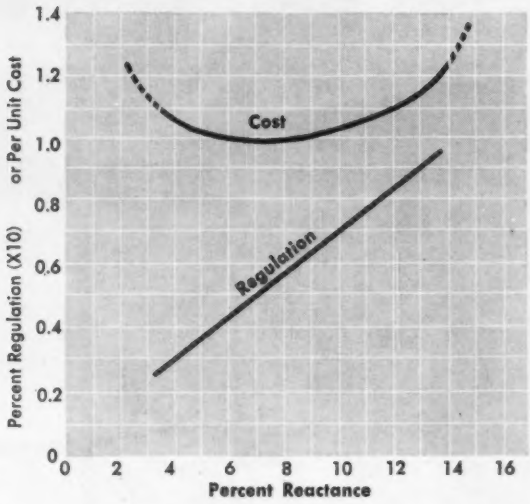


FIG 3—COST CURVE is relatively flat between 6.5% and 8.0% reactance. Best design occurs near 7% reactance

The variation of active materials in a power transformer with reactance is shown in Fig 1. Used for this comparison is a 20-Mva 3-phase, 350-kv BIL, self-cooled transformer. Note that the quantity of iron decreases, but that of copper increases as reactance goes up.

Core and copper losses are about proportional to the amounts of core steel and copper, respectively. These relations are shown in Fig 2 for the transformer mentioned. The most economical design occurs near a reactance of 7%, with the cost curve remaining relatively flat between 6.5 and 8.0% reactance as shown in Fig 3. In general, these relations apply to all types of cooling.

The range of economical reactances at various insulation levels and for different types of cooling is tabulated. These transformer reactances have been established by long usage as the most economical for the manufacturer, and as satisfactory for the majority of power transformer users.

The three fundamental relations also hold for three-winding transformers, except that three reactances are involved. Each reactance applies to a pair of windings and is found in the same way as for a two-winding transformer. In a three-winding transformer with the standard concentric arrangement of windings, the lowest-voltage winding usually is next to the core. The intermediate voltage winding encircles the low; the highest voltage winding is on the outside.

For an economical design it is satisfactory to use a standard reactance between the highest-voltage and intermediate-voltage windings corresponding to the value for a two-winding transformer. To show how the other reactances between windings are related, reactances are identified in the accompanying panel. All reactances are expressed on the same kva base and the rated voltage of each winding. For standard concentric winding arrangements, if (H-X) is specified, values of (X-Y) for an economical design are given by formula (1); values of (H-Y) are given by formula (2).

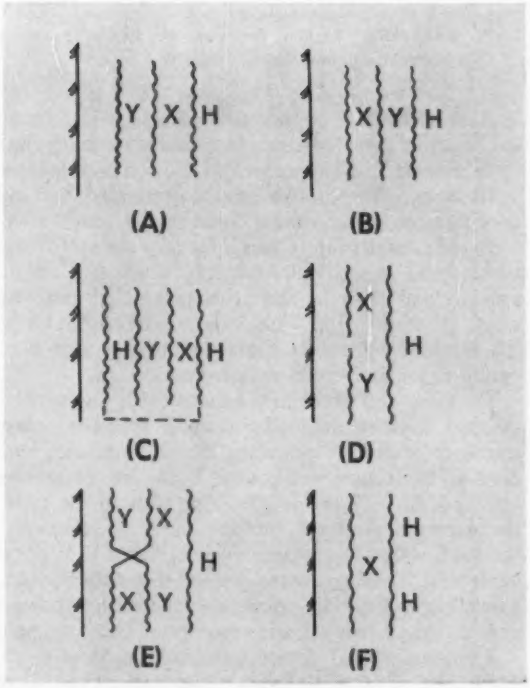
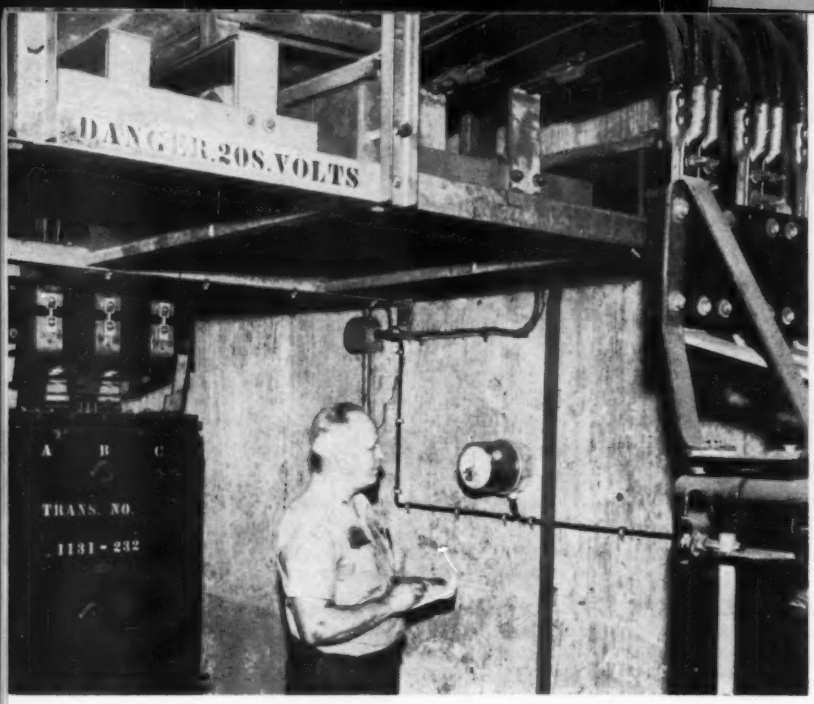


FIG 4—WINDING ARRANGEMENTS represent each leg of a 3-phase transformer, or one leg of a single-phase unit. Winding (A) is common, most economical type

The same reactance relations exist between windings of an autotransformer, but the terminal reactance relations differ because of the interconnection of windings. The same symbols in the panel are used again, the tertiary winding of the autotransformer being taken as

(*Continued on page* 104)



How to

J. P. **GALASSINI**, Section Engineer, H. **PENSKY**, Engineer, Commonwealth Edison Co, Chicago, Ill.

A new method of measuring loads in ac network vaults affords five advantages over the former scheme.

In the past, Commonwealth Edison Co measured vault loads with portable graphic ammeters and split-core transformers. A crew could do 20 vaults a week.

Rapid growth of the Chicago ac network system made this method impractical, especially in summer, the most critical load period. During a protracted heat wave when all vault loads should be measured, crews with this portable equipment could not possibly visit enough vaults to obtain sufficient information.

To solve the problem, Comonwealth engineers developed the new method—a small split-core current transformer and an indicating thermal ammeter with a push-up maximum indicator. Both are permanently installed, the CT to the steel ring around the base of the network protector bushing, and the ammeter to the vault wall. The ammeter is calibrated to read total vault load. Load current is measured in only one phase. Travelling substation operators record the indicating and maximum vault loads, then reset the ammeter.

The ammeter-CT device was tested in 55 of the 520 downtown ac network vaults. The test proved so successful that the device is being considered for practically all vaults serving multiple customers. The estimated average installed cost is $95 per vault.

The new method affords five advantages:

1. Measuring costs are cut in half.
2. Portable metering equipment and some engineers are released for other work.
3. Technicians, under direction of an engineer, can process the vault load information.
4. Maximum loads on all vaults are available at all times for substation operators and system planners.
5. Instrument maintenance is reduced.

The design of the CT takes advantage of the ammeter's low burden and the available high current, 1,200 to 2,000 amp. The CT is small (less than 1-sq in. cross section), inexpensive, and easy to install.

Safety is a special feature of the CT design. Open secondary voltage, less than 50 v, eliminates the need for expensive short-circuit switches, test switches, and safety devices. On tests with an oscilloscope the peak open secondary voltage at full load was 34 v.

The overall ratio error of the ammeter-CT is within 2.0% for 25-100% full scale. The CT ratio of 2,400/3 matches the 3-amp rating of the ammeter.

In vaults with four or more network transformers, equal load is maintained on all units by balancing transformers. There, only one CT and one ammeter are installed, with the ammeter calibrated to read total vault load. One, two, and three-unit vaults, however, are equipped with a CT on each unit and a single ammeter to measure total vault load.

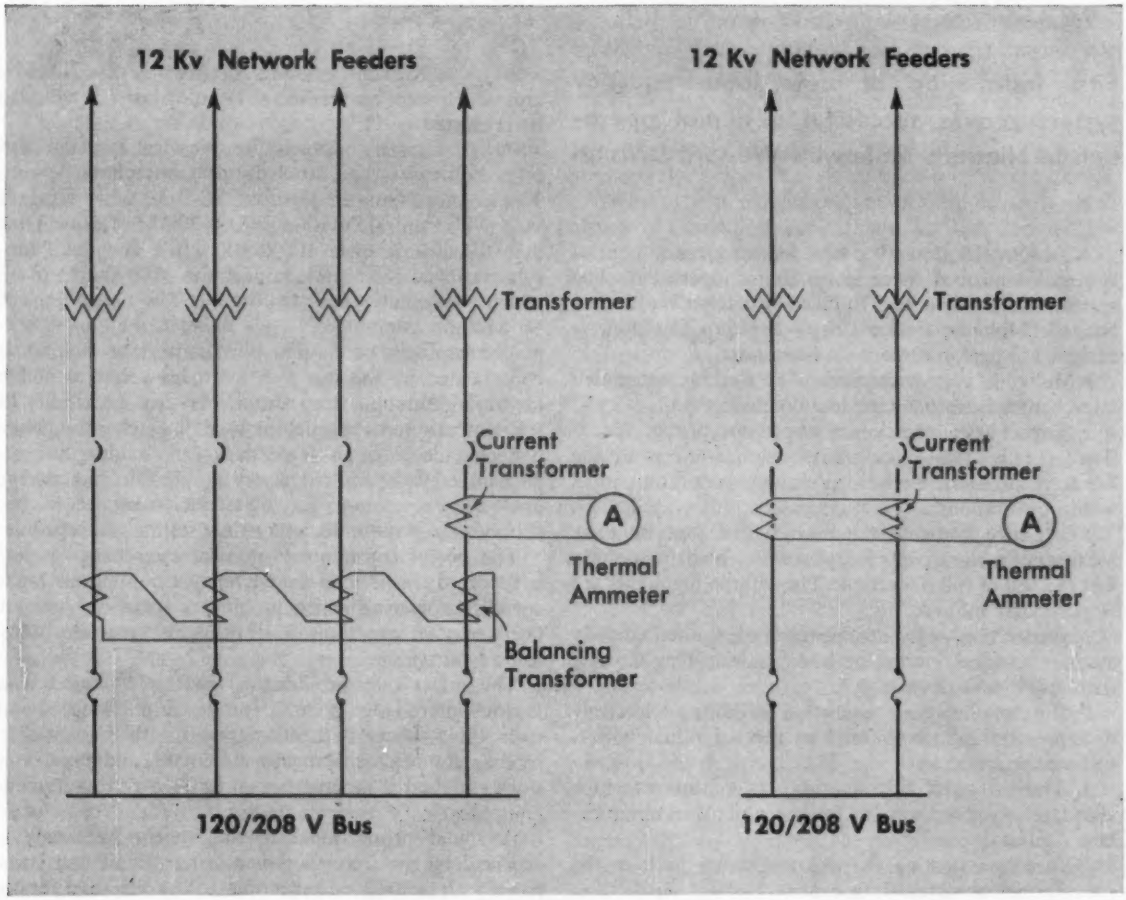
One shortcoming of this scheme arises when false readings result from outages of network feeders and transformers. These outages cause a redistribution of load current among transformers, which affects vault loadings in all cases except spot vaults.

False readings also are obtained in multi-transformer vaults equipped with balancing transformers and only one metering CT, if the outage occurs on a transformer not equipped with the metering transformer. In a four-transformer spot vault this outage would result in an indicated vault loading 33% higher than actual. To separate possible false readings, system operating conditions must be known in analyzing vault load reports.

The operating department maintains a record of all network feeder and transformer outages. Copies of these records are forwarded periodically to the system planning department for analysis. A technical assistant under the guidance of an engineer studies the reports for abnormal readings and pertinent outages.

Improve Your Network Load Metering

New scheme developed by Commonwealth Edison for measuring loads in downtown ac network vaults is better than old method in five ways. It utilizes current transformers and thermal ammeters permanently installed in the vaults



LOAD IS READ on a four-transformer ac network vault with only one current transformer and one thermal ammeter with scale multiplied by four. But a two-transformer vault requires a CT on each unit and a single ammeter

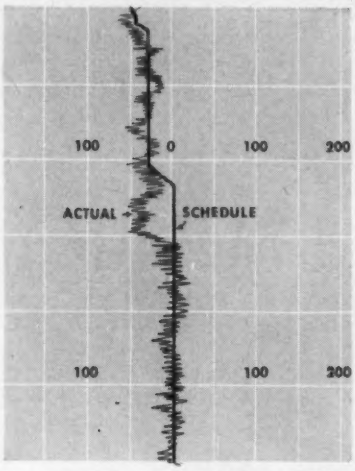


FIG 1—NET INTERCHANGE follows control signal closely at morning pickup

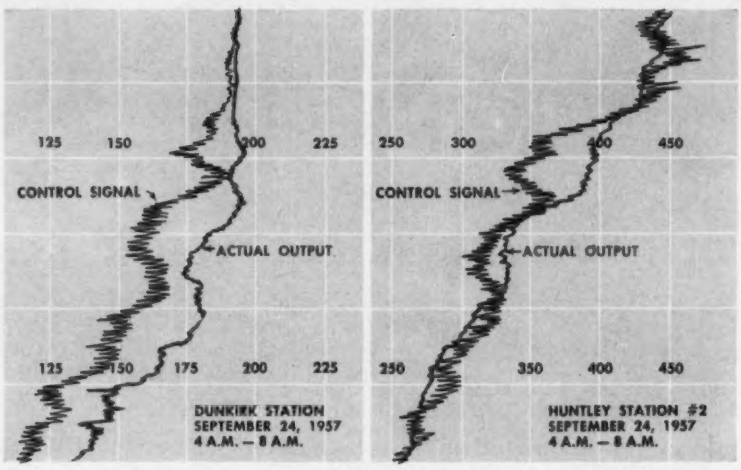


FIG 2—ACTUAL OUTPUT and command signals for Dunkirk and Huntley Stations can be compared on this chart. It was recorded at same morning pickup as Fig 1

Operation Proves Design of New Load

First installation of new load-frequency system proves successful in initial operation in Niagara Mohawk's Western Division

A first installation of a new load-frequency control system has proved successful in initial operation. The system, installed in the Buffalo dispatcher's office of Niagara Mohawk Power Corp's Western Division, is designed to perform two main functions:

- Maintain system frequency as well as scheduled interchange on four major interconnections.
- Correct system frequency and assure proper allocation of generation among two steam stations in the Western Division, as well as among generating units within the stations.

The entire control system, designed and built by Minneapolis Honeywell Regulator Co, has successfully met the test of full operation. These three highlights are of particular interest:

1. Generating units are being loaded automatically at close to ideal incremental heat rates. This is done with solid state devices.
2. Rate of changing generation is limited effectively to a preset value determined by the individual boiler-turbine combinations.
3. Transistorized telemetering is continuous, high speed, reliable, and suitable for use with all communication media.

Before investigating its performance, a look at the overall control system is in order.

Two steam stations are regulated by the system: Huntley with 6 60-cps units totaling 540 Mw, and Dunkirk with 2 units totaling 200 Mw. A new 200-Mw unit which went on the line at Huntley last fall will also be regulated.

Power transfer between the Western Division and other sources is measured at each interchange point. Ties connect Ontario Hydro (300-0-300Mw) Niagara Mohawk's Central Division (300-0-300 Mw); New York State Electric & Gas (100-0-100 Mw); and the Pennsylvania-New Jersey interconnection (100-0-100 Mw), which is normally open. On the 300-Mw ties, swings of 50 Mw are common.

The problem of tie-line bias control at Buffalo is complicated by the fact that hydro power is available in varying amounts from Ontario Hydro. Flexibility of the control system permits the load dispatcher to change his schedule as often as desired. It provides the predetermined bias for frequency correction and always loads the two stations for lowest incremental cost. No supervision is required, other than setting the schedule.

The power transfer measured at interchange points is reported to the load dispatcher via continuous high-speed telemetering which provides a specific signal for every transfer condition. This results in great sensitivity to transfer changes.

The power totalizer adds the signals telemetered from various interchange points. The new interchange signal from the totalizer is then compared with the schedule by the net interchange measuring circuit, and any deviation is applied as an error signal to the area requirement computer.

A signal proportional to the system frequency is received by the frequency-measuring circuit and compared with the frequency set point. Any deviation results in an error signal which is modified by the frequency bias setting and applied as input to the area requirement

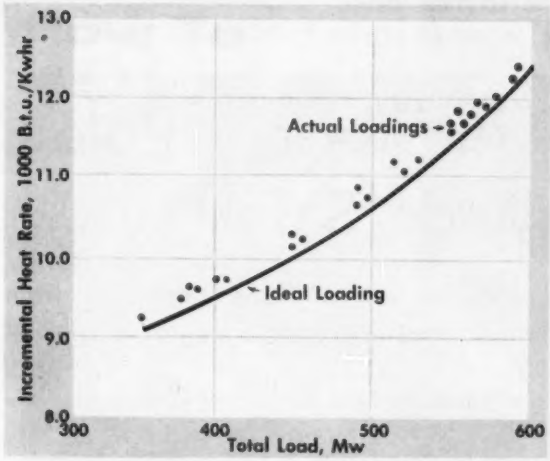


FIG 3—ACTUAL LOADINGS of all generating units closely follow incremental heat rate. Deviation is under 2%

Control System

computer. The frequency input signal can originate from any point in the power system.

The area requirement computer provides an error signal output to the controller only when the algebraic sum of the net interchange and frequency error signals deviates from zero. Scheduled and actual net interchange can be seen on Fig 1.

A change in the required generation level results in an error signal from the area requirement computer, which produces a change in the controller output to the new generation demand level. The output of the controller is proportional to the controller generation demand of the area.

The allocator divides the area demand between Huntley and Dunkirk Stations according to a preset loading pattern and provides a generation command signal for each station. At the stations, the allocator signals can be reallocated among the generators. The reallocation signals are compared with the generator output, and any deviation produces an increase or decrease in generation sufficient to correct for the original deviation of net interchange and frequency.

Fig 2 shows command and output at Huntley and Dunkirk Stations. There is a time offset between command and output because one recorder pen must be passed by the other.

Alarms at all critical points trip the system off control, suspend control, or provide visible and audible indications of telemetering failure. All trip alarms must be reset manually to return the system to control.

The frequency-measuring circuit also has a deviation alarm, adjustable over a very narrow range. The net interchange and area requirement portions of the system employ high-low visual and audible alarms adjustable over full range.

A maneuvering band is provided by high and low load alarms at Huntley and Dunkirk. These alarms block the control signal from the allocator circuit when the signal calls for a station generation output greater than either load alarm setting.

1. Loading Generating Units Economically

Generating units are loaded at close to ideal incremental heat rates. Fig 3, a curve illustrating results of incremental loader checks, compares the actual composite maximum unit heat rate with desired heat rates for the units at Huntley and Dunkirk. The incremental loader effectively divides station output among the units, with a deviation less than 2% from ideal.

The incremental loader consists of the telemeter transmitter and an allocator in the load dispatcher's office. It apportions the control signal to Huntley and Dunkirk according to a preset loading curve for each station.

The allocator, as well as much of the equipment in the entire control system, employs electronic servo devices. These are simply relay-rack-mounted units which measure, compute, and provide control functions. Each servo incorporates an amplifier, balancing motor, and heavy-duty slidewire assembly.

2. Limiting Generation Changes Safely

Although the incremental loader can load generating units quickly and economically, it is necessary to limit the speed of turbine-generator response to meet boiler conditions. Evaporation rates of boilers change much more slowly than generator speeds, and if steam is withdrawn too rapidly on an increased load, pressure will drop. It is even possible that water will be carried into the turbine and damage the blades.

Generator response is slowed down by a rate limiter, a device which recognizes the magnitude of a rapid change of generation. Adjustments are included to allow instantaneous changes of a desired magnitude and, beyond that, sustained changes of a desired rate per minute. If the magnitude of the change called for is greater than the pre-set limit (as determined by the boiler-turbine combination), the rate limiter interrupts the signal. Actually, it interrupts the power supply from the governor motor actuator to the motor.

The rate limiter permits a continued change of generation toward that needed to satisfy system requirements, but at a rate safe for the associated equipment. As the rate limiter continuously adjusts itself to the average value around which it is working, it need not be reset if the mean level of operation changes greatly.

3. Transistorized Telemetering Proves Reliable

Transistorized telemetering has proved fast, continuous, reliable, and usable with all communication media.

Because the accuracy of conventional telemetering varies with changes in temperature, voltage, and frequency, a completely tubeless device using solid-state concepts was designed. This unit will hold within $\pm$ 1% accuracy through a range of 30 to 120F.

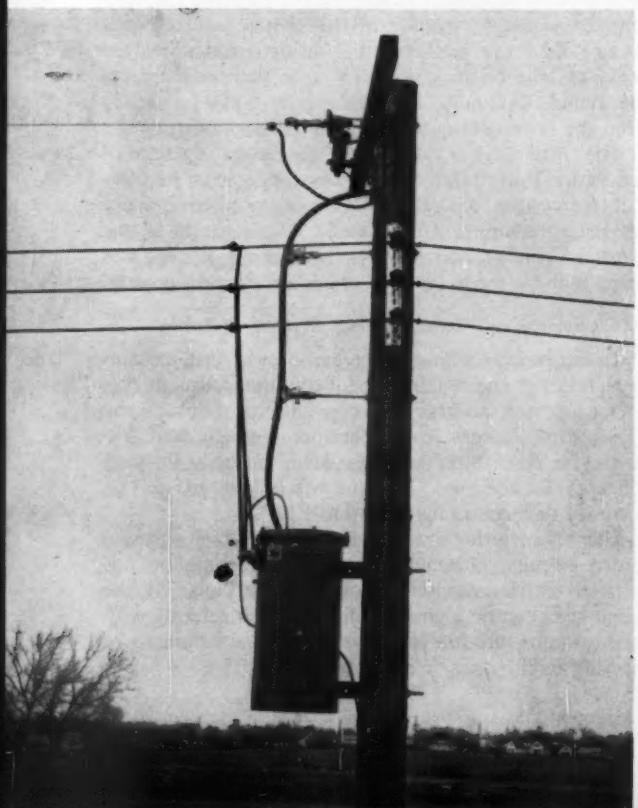
The telemetering system is operated over ground return circuits, although the telephone company has installed carrier equipment on some circuits. If the signal level can be high enough without interfering with other circuits, ground return is a satisfactory means of carrying intelligence or control signals.

Transformer Pole Made Safer

Installation with flexible tubing to train primary has economic advantages as well

H. N. DILLER, Distribution Engineer, Central Illinois Public Service Co, Springfield, Ill.

POLYETHYLENE TUBING covers primaries from cutout to bushing to provide safe economical transformer installation



PRIMARY CONDUCTORS in flexible polyethylene tubing are supported by double arming bolts, top groove insulators

Safe, economical transformer installations have been designed by Central Illinois Public Service Co through the use of flexible polyethylene tubing to train the primaries from cutout to bushing. Advantages are:

1. Complete protection between bushings and cut out.

2. Costs slightly lower than previous designs.

3. Linemen working on the pole need to "cover up" only the bushings.

4. Appearance of the transformer pole is improved.

5. Working space on the pole is less restricted.

6. Service drops cannot contact primary risers, even when heavy limbs are blown into the installation or a pole is broken. The only exposed point in this design is at the transformer bushing where linemen must still use an insulator hood or small blanket.

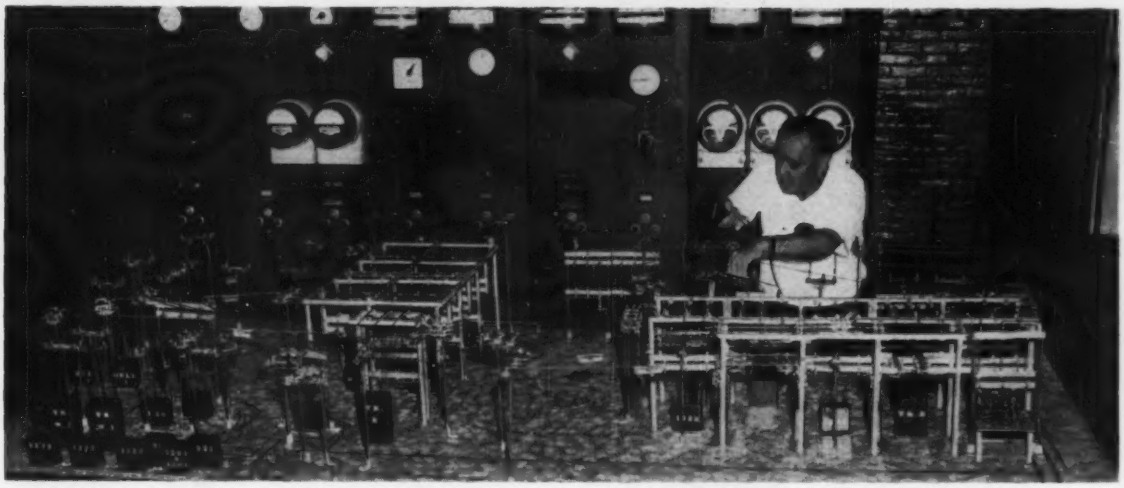
The new design was developed to cope with the high percentage of accidents on transformer poles. Cost of the new design is slightly less for single-phase installations, as it eliminates one crossarm. For a 3-phase transformer bank the material cost, including the tubing, remains the same, but the labor cost is less.

Tubing Offers Long Life, High Insulation Value

The polyethylene tubing offers long life, high insulation value, and flexibility. The "continuous conduit" from cut to bushing is supported clear of the pole by a double arming bolt, ridge pin adapter, and wide groove insulator. At the transformer, an 18-in. ridge pin is bolted to the pole mounting bracket on the transformer to support the tubing clear of the transformers and pole. Tubing is tied to the insulators on the double arming bolts and the ridge pin as though it were a conductor.

Use of insulators between the tubing and ground provides sufficient impulse strength so that any surges will flash over either at the cutout or the bushing. This preserves the insulation of the tubing.

The polyethylene tube arrangement is an improvement over rigid conduit; it eliminates the exposed wire where the transition is made from the crossarms to the vertical run on the pole. Individual lengths of polyethylene tubing on the pole offer protection, but they are easily pierced by a lineman's spur and offer opportunity for a lineman to maintain intimate body contact with the tubing. Support of the tubing away from the pole overcomes these objections.



Model Substation Aids Training, Operations

SUBSTATIONS—Planning

A model of East Weymouth, Mass., substation, built to a structural scale of ½ in. per ft and equipped even with miniature buses and disconnecting switches, aids in the training of operators at this attended substation of the Weymouth Light & Power Co, subsidiary of the New England Electric System. It is available to experienced men at the control switchboard as a reminder.

The substation is a central distributing point, supplying four municipalities as well as areas of Weymouth. The model shows the "high lines" in diagram form on the table surface, and the above connections are made to miniature switches, transformers, and circuit breakers. Lines are identified as to voltages by the following colors:

Blue, 11 to 13 kv
Orange, 22 kv
Gold, 2.4 to 4.16 kv.

On the diagram, substation circuit inclosures are indicated by solid lines, and underground conductors by broken lines. Transformers and circuit breakers are numbered sheet-steel blocks, buses and conductors are welding rods, and the bus structure consists of flat steel and angle irons.

More than 200 airbreak switches, soldered to conductors, can be manually opened and closed. Lights give the status of switches.

DISTRIBUTION—Maintenance

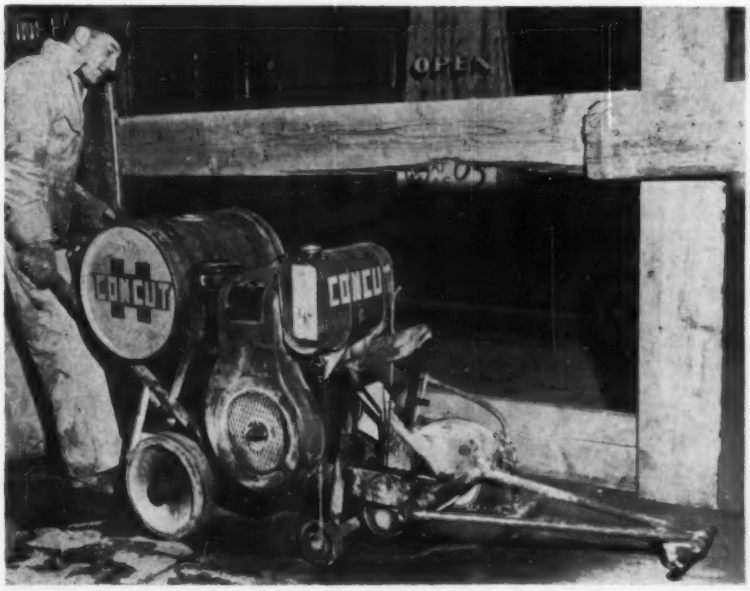
Cutter Provides Edge for Sidewalk Finishing

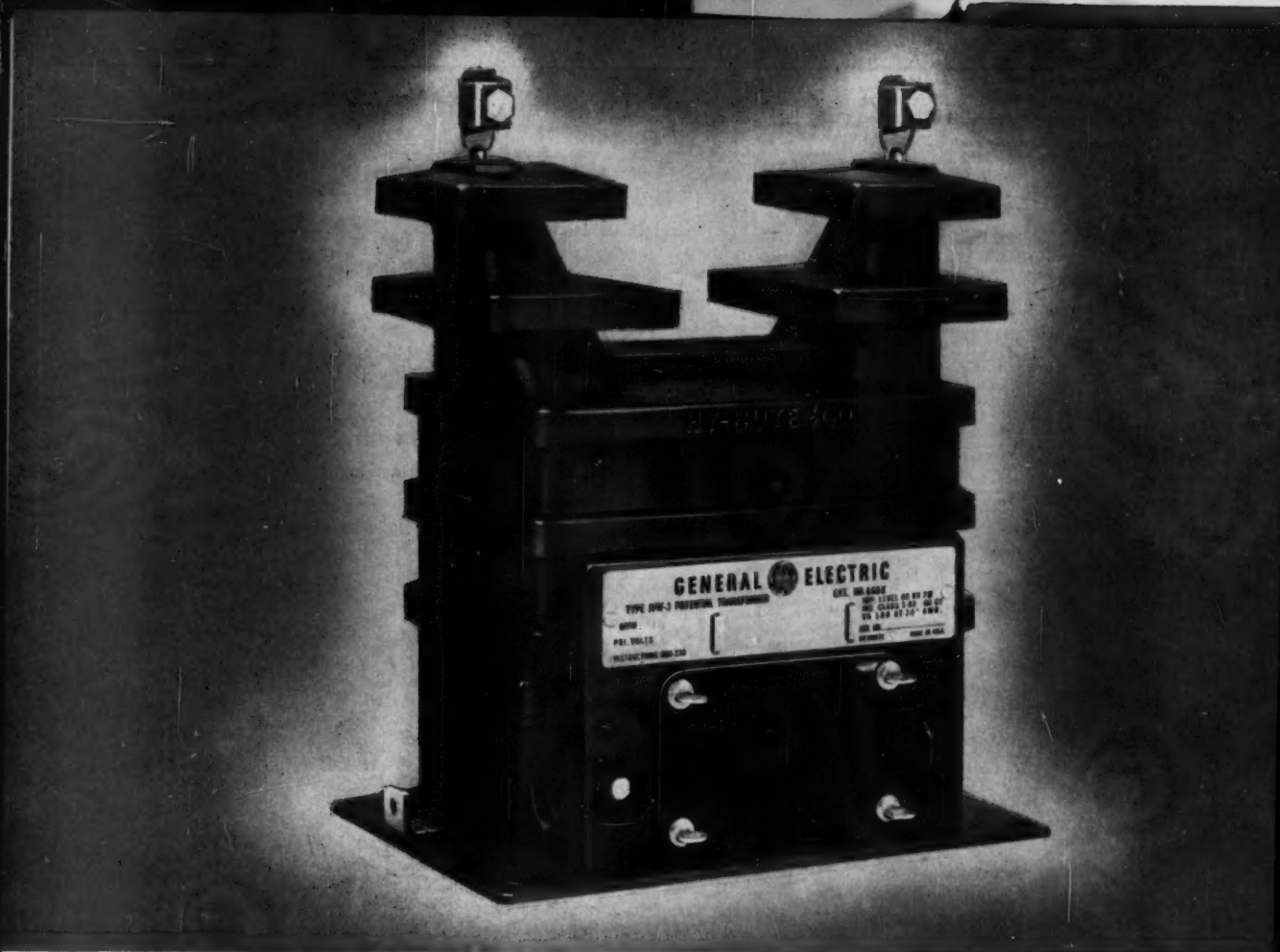
R. K. WOODSON, Assistant Superintendent, Underground Dept., Kansas City Power & Light Co, Kansas City, Mo.

Ragged edges in sidewalk repair work can be eliminated by cutting the concrete before breaking holes in it. When repaired, it will then appear as a finished construction joint. A diamond-edged and water-cooled blade can be used to cut the top ½ to ¾ in. of the walk.

The concrete cutter has preserved customer goodwill and reduced the manhours previously required for answering complaints, although it has not cut the cost of construction.

(*More How To on page* 78)





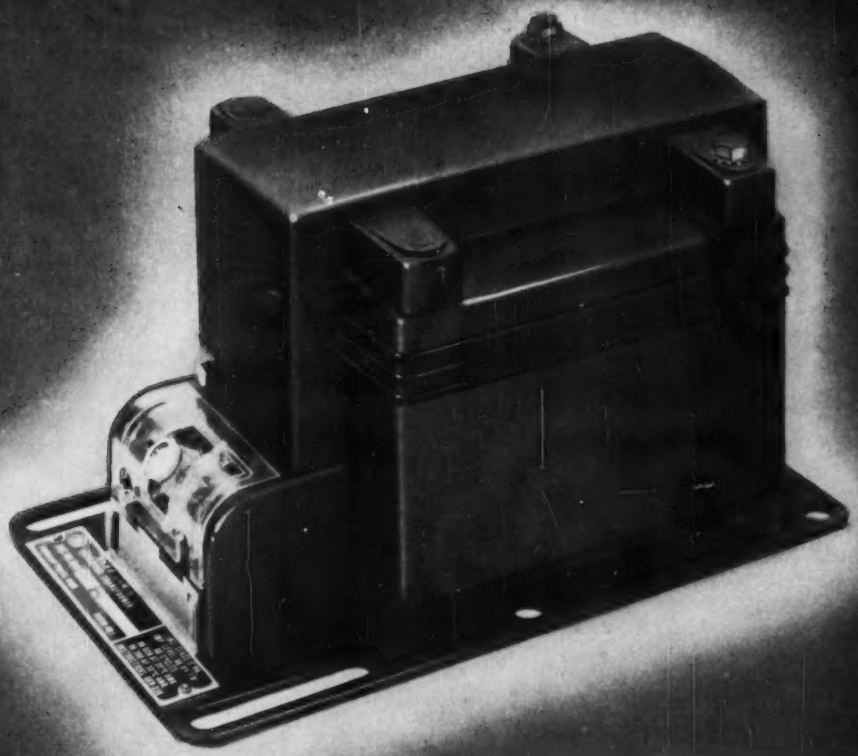
JVW-3 Outdoor

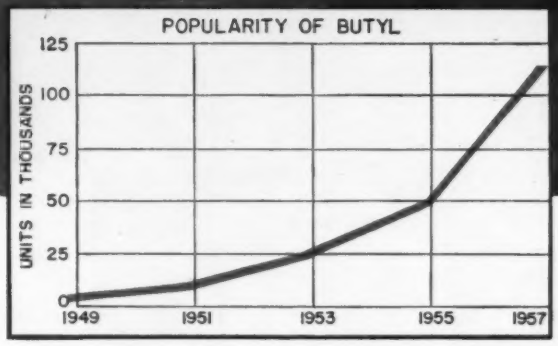
INSULATION CLASS:	5 KV
IMPULSE LEVEL:	Full Wave, 60 KV
ACCURACY CLASS:	0.3 W, X, Y, 1.2 Z
FREQUENCY:	60 cycle
THERMAL RATING:	600 va, 30 C ambient
HEIGHT AND WEIGHT:	12 13/16 in., 50 lbs

FROM GENERAL ELECTRIC

FIRST

Potential Transformers With Butyl-Molded Construction





JVM-3 Indoor

INSULATION CLASS:	5 KV
ACCURACY CLASS:	0.3 W, X, Y, 1.2 Z
IMPULSE LEVEL:	Full Wave, 60 KV
FREQUENCY:	60 cycle
THERMAL RATING:	600 va, 30 C ambient
	200 va, 55 C ambient
HEIGHT AND WEIGHT:	7¾ in., 32 lbs

NOW . . . to reduce your metering and relaying costs . . . General Electric offers the first butyl-molded potential transformers. Designed for circuits up to 5-KV, indoor and outdoor, the new butyl-molded potential transformers provide greater service reliability, easier installation, at less maintenance and replacement expense.

HIGHLY ACCURATE, the new butyl-molded pots meet or exceed ASA standards for accuracy and combine all the advantages of molded butyl—already well known to users of General Electric's wide line of molded current transformers.

SMALLER AND LIGHTER, with size reductions up to 50 per cent, the new butyl-molded potential transformers make possible significant space savings in substations and switchgear . . . can be mounted in any position, resulting in less costly wiring.

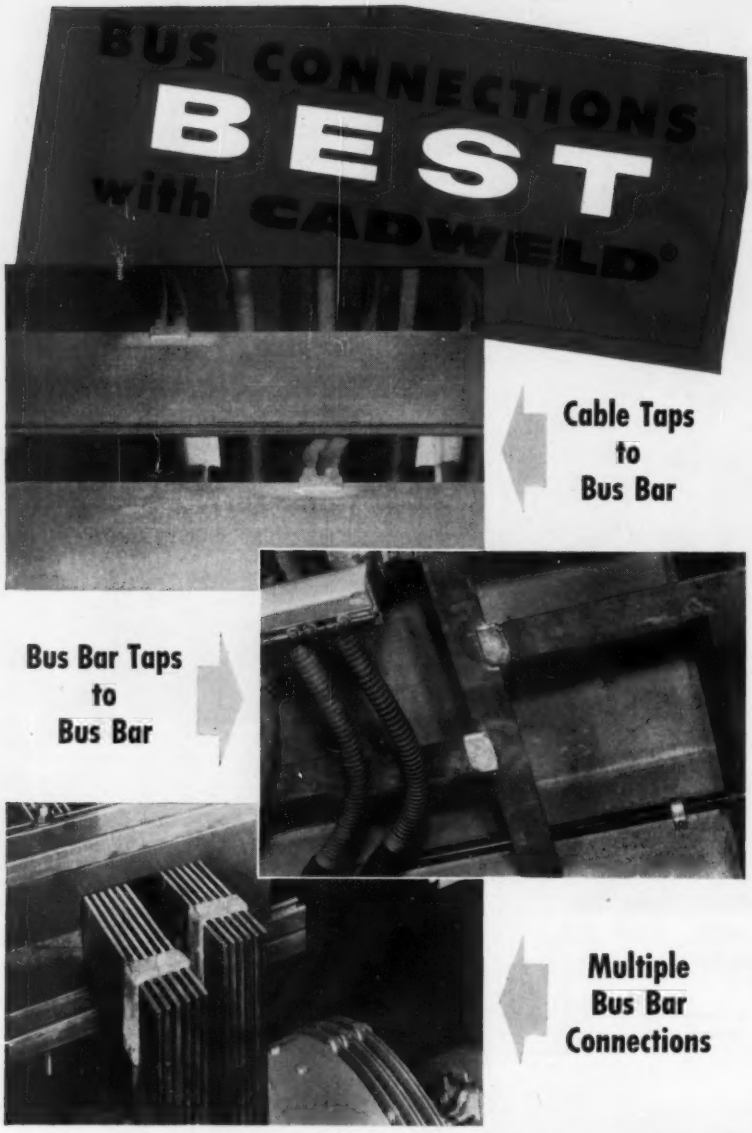
TOUGH, FLEXIBLE BUTYL serves as combined bushing, case, and insulation. Both indoor and outdoor types are fire and explosion-resistant and have a low, stable power factor. Creepage and flashover distances are equivalent to those normally used for the next higher voltage levels. No ionization is encountered at operating voltage.

CORROSION-RESISTANT, the outdoor type features General Electric's revolutionary Hy-Bute/60, combined with stainless steel accessories for even greater resistance to corrosion.

A "CERTIFICATE OF TEST" is tagged to each transformer you buy, certifying that the transformer has passed insulation and accuracy tests. Use of this certification can eliminate the time and expense of conducting acceptance tests, resulting in a bigger savings for you.

FOR FURTHER INFORMATION, write: Section 581-6, General Electric Co., Schenectady 5, N. Y., or call your nearest General Electric Apparatus Sales office.

GENERAL ELECTRIC



When making electrical connections to bus bar, CADWELD is best. 100% electrical current carrying capacity of the conductors is obtained every time. Plus every connection is permanent, there is no loosening or corrosion.

90% of the possible connections are standard and the remaining 10% (specials) can be handled in record time.

The finished CADWELD connection is more compact than any mechanical connection on the market.

CADWELD Electrical Connections have attained their high rating from Engineers and Contractors for their reliability. There is no maintenance on a CADWELD Connection.

CADWELD®

Erico Products, Inc.

2070 E. 61st Place Cleveland 3, Ohio

IN CANADA: ERICO INCORPORATED, 3571 Dundas St., West, Toronto 9, Ontario

Join Aluminum to Copper Reliably

W. E. SHAFER, Supervisor, Right of Way Maintenance, Virginia Electric & Power Co, Richmond, Va.

Transition joints for connecting aluminum to copper conductors are being installed by Virginia Electric & Power Co. These special joints provide very reliable connections and save crew time.

First Splices Made in Field

The first transition splices were fabricated in the field for connecting No. 4 solid aluminum services to copper secondaries. These joints consist of a copper tail compressed in an aluminum sleeve having a solid stop in the center and a groove on each end. These act as temporary crimps. The tail is connected to the copper secondary by a bolted bronze connector; the aluminum service is compressed in the sleeve.

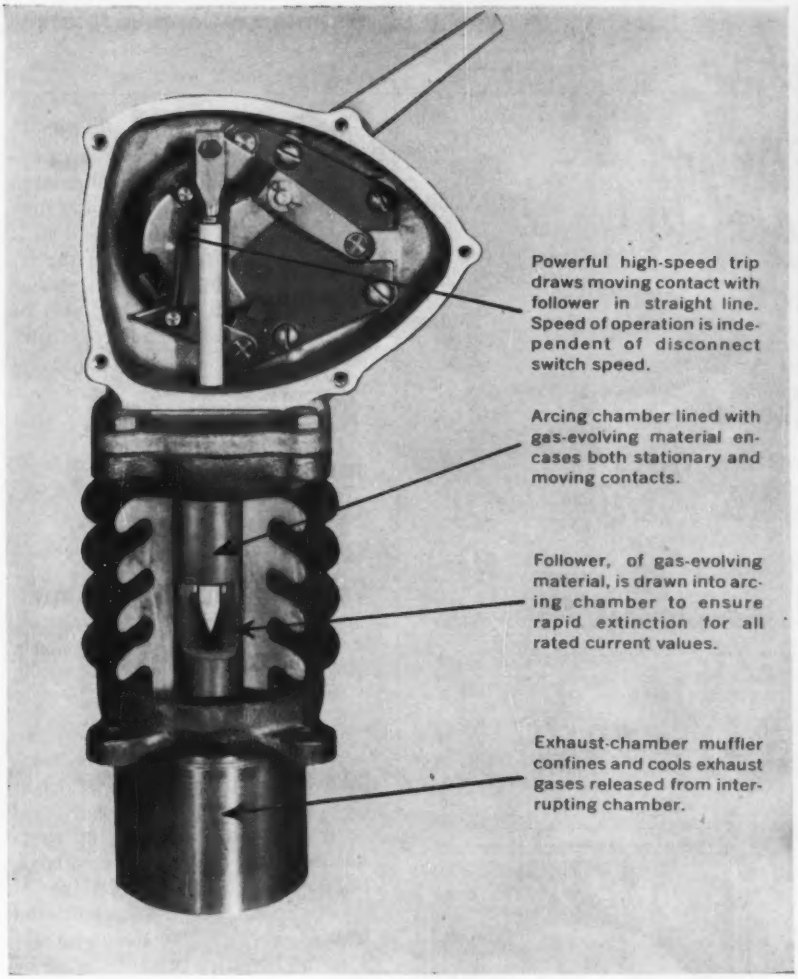
As the use of these joints expanded, it was decided to make the leads temporarily in the salvage shop. Now, crews make the joints during bad weather. Sizes fabricated are No. 4 stranded copper to No. 4 ACSR; No. 2 copper to No. 2 ACSR; and 4/0 copper to 3/0 ACSR. Covered wire is more acceptable than the bare conductors used initially.

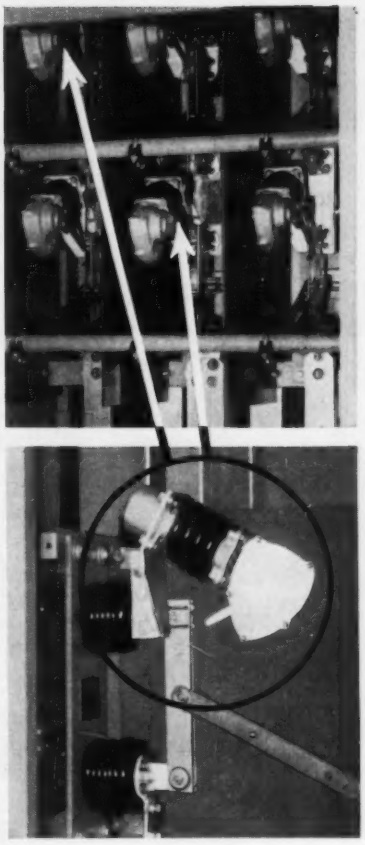
No Failures to Date

Transition joints have been used for several years; there has not been a failure reported to date. Among their advantages is an assurance that inhibitor is protecting the joint, because the inhibitor is factory-packed in the sleeve.

When a considerable reduction in size is involved between a large aluminum secondary and a smaller service, ⅝ and ½-in. aluminum compression sleeves are used. They are connected to the secondary with aluminum-bolted connectors. The compression joint to the aluminum or copper service generally is made in the field. This practice reduces the stock sizes of connectors, and

(*Continued on page* 80)


Powerful high-speed trip draws moving contact with follower in straight line. Speed of operation is independent of disconnect switch speed.
Arcing chamber lined with gas-evolving material encases both stationary and moving contacts.
Follower, of gas-evolving material, is drawn into arcing chamber to ensure rapid extinction for all rated current values.
Exhaust-chamber muffler confines and cools exhaust gases released from interrupting chamber.



A typical installation—two Delta-Star 3-pole, indoor group-operated disconnects equipped with POWERUPTER SWITCHES installed in a metal-enclosed cubicle.

Break rated loads instantly and safely with DELTA-STAR POWERUPTER SWITCHES

No external arc; ideal for cubicles and unit substations

Here is an unusually safe, positive interrupting switch, ideal for use in small enclosed spaces where safety is vital. With the Delta-Star POWERUPTER SWITCH there is *no external arc,* no danger of phase-to-phase or phase-to-ground faults. Therefore, men and equipment are safe even if the unit is inadvertently operated.

Indoor POWERUPTER SWITCHES are available in combination with fuses. Ratings from 7.5kv through 34.5kv, with 600-amp. interrupting capacity; continuous current ratings of 400, 600, 1200, and 2000 amperes. For complete information, call your nearest Delta-Star representative or write *Delta-Star Electric Division, H. K. Porter Company, Inc., 2437 Fulton St., Chicago 12, Illinois. District offices in principal cities.*

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Connors Steel, Delta-Star Electric, Disston, Forge & Fittings, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, H. K. Porter Company (Canada) Ltd.

You Get More Economy, Meter Reliability!

In over 8 million meters with magnetic suspension put in service, not one magnetic suspension assembly has ever been replaced as a result of wear. Ask your G-E salesman, he'll show you the facts.

628-4

GENERAL ELECTRIC

WARN LOCK-O-MATIC HUBS

APPROVED 'Jeep' EQUIPMENT

Automatically "idle" the front drive in 2-wheel drive

SAVE GEARS, TIRES, GAS!

Warn Hubs make your 4-wheel drive more useful than ever, because they make it into a "free-wheeling" 2-wheel drive, as well as a 4-wheel drive! Use it either way—automatically—*as you shift!* With Warn Lock-O-matics it *always* free-wheels in 2 w.d., always engages in 4 w.d., forward or reverse, *as you shift.* You automatically reduce front end wear, engine load, tire wear in 2 w.d.—there is no drag, gear whine, shimmy. Ask your 4-wheel drive dealer for a free demonstration of Warn Lock-O-matic or Locking (manual) Hubs today, or write. Models for all 4-wheel drives to 1½ tons.

Patented

WARN SELECTIVE DRIVE HUBS

WARN MFG. CO. Riverton Box 6064-EW 2, Seattle 88, Wash.

Aluminum-Copper Joints

(*Continued from page* 78)

provides an adequate connection.

As an example of the reducer application, a 300-MCM aluminum secondary at a shopping center may be tapped with either a No. 4 or 2 aluminum service drop. For the reduction, a ½-in. aluminum service sleeve is placed on the tap side of the bolted aluminum connector after the service tap is compressed in the sleeve.

DISTRIBUTION—Operations

Telescoping Hot Stick Cuts Climbing, Saves Time

A. E. HAAK, Southeastern Div Operating Supt, Louisiana Power & Light Co, Metairie, La.

A telescoping hot stick is being used by Louisiana Power & Light Co for operating disconnects and refusing cutouts. Use of the easy-to-handle stick saves time and labor because it eliminates climbing of poles during some operations and trouble shooting. For this same reason, the hot stick might be used by engineers or other qualified men during emergencies to speed restoration of service.

Stick Weighs 7 Lb

Costing about $80, the stick consists of seven 4½-ft sections of tubular fiber glass, rated at 75,000 vpf. Sections are of different diameters and slide within one another. On top of the smallest section is a universal head for attaching different tools. Because the stick weighs only 7 lb, it is easy to handle.

To elongate the hot stick sections are pulled out individually and held in place by built-in friction joints. The stick is collapsed by hitting the bottom against the ground. In its collapsed size the stick can be easily carried in a car.

Over 20 in Use

At present, over 20 of these hot sticks are being used in the South-

(*Continued on page* 82)

ROEBLING TELLURIUM LEAD ALLOY SHEATH...

NO AGE-HARDENING PROBLEMS!

There's nothing worse to an electrical utilities system than hardening of the arteries. That's a problem eliminated by Roebling Tellurium Lead Alloy Sheath! Even after 6½ years' life (in the lab and on the job), age-hardening is negligible in this remarkable sheath. Moreover, heat stability is outstanding . . . bending life is 4½ times greater than that of ordinary sheath . . . there's almost no "creep" at all!

The Roebling Paper Power Cable inside is built for dependability and long life, too. In fact, there's no better buy than Roebling Paper Power Cable with Tellurium Lead Alloy Sheath! An interesting technical booklet, now available, tells you exactly *why* it's such a good investment. Write for your free copy to: Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling electrical wires and cables are available with either copper or aluminum conductors.

NOW···GLOBE OFFERS···
two new INTERCHANGEABLE trays for support of cables, wiring and tubing

★ Engineered for uniform design and easy installation
★ Steel or aluminum construction
★ Complete accessories for SPEEDIER Installation
★ No sharp edges to damage cables
★ Complete interchangeability

Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities—consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.

109

PRODUCTS DIVISION

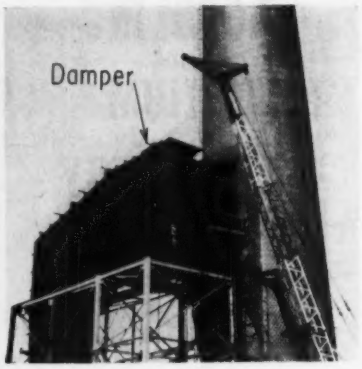
The **GLOBE** *Company* MANUFACTURERS SINCE 1914

4030 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

Hot Stick Saves Time

(*Continued from page* 80)

eastern division. No other tool has received such an enthusiastic reception. Every stick has more than paid for itself by speeding service restoration and saving manhours.



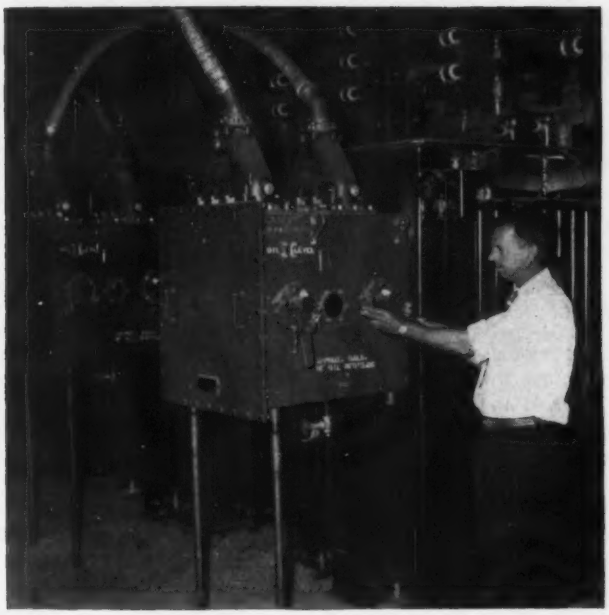
Breeching Passes Smoke While Stack is Extended

R. S. CAUSEY, Asst Supt of Production, Georgia Power Co, Atlanta, Ga.

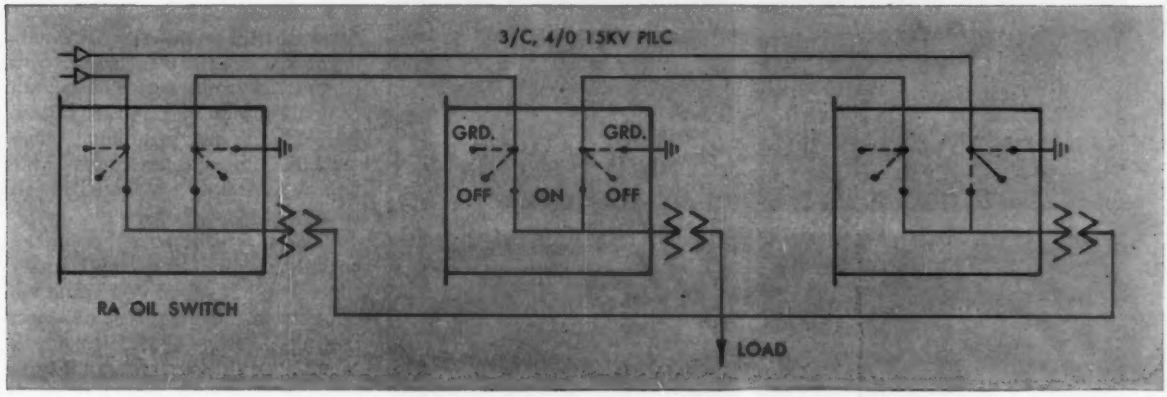
Georgia Power Co temporarily modified the smoke breeching at Plant McManus to discharge smoke directly from the breeching rather than through the stack. The modification permitted the stack to be extended 20 ft without a long shut-down of the plant.

A damper was welded on the end of the smoke breeching to the stack. Then a hole was cut in the breeching under the damper, through which smoke was discharged. To prevent smoke from passing up the stack, a bulkhead was bolted over the opening between the breeching and the stack. This bulkhead was sealed with a gasket of asbestos rope.

Extension of the brick stack was necessary for a new 75-Mw unit. To prevent a complete shut-down of the existing 40-Mw unit, the company modified the breeching one week-end to reroute the smoke. When the extension was completed, the bulkhead was removed and the damper welded shut on another week-end when the 40-Mw machine was not needed.



LOOP AROUND COSTLY SERVICE INTERRUPTIONS



Expensive service interruptions to a large building are minimized by looping feeder cables through G&W RA oil switches. The load is supplied by a southern utility through two feeders and three 3 phase transformers. Any two transformers or either feeder cable can carry the load for a short time. Looping the feeder cable through the oil switches (attached to transformers) permits disconnecting and grounding the feeder cables and interconnecting cables. The RA manually operated switch will safely break a full 400 ampere load at 15000 volts.

An economical RA load break oil switch is made to suit your distribution system plans. Consult a G&W representative about it.

VOLTAGE CHARACTERISTICS

voltage rating	60 cycle withstand dry	impulse withstand 1½ x 40 wave
7.5kv	36kv	95kv
15.0kv	50kv	110kv
23.0kv	70kv	150kv
34.5kv	95kv	200kv

CURRENT CHARACTERISTICS

ampere rating	switch	amperes	
		momentary	4 seconds
400	standard	20,000	15,000
	special*	30,000	19,000
1000	standard	40,000	35,000
	special*	50,000	40,000

*silver inlaid contacts

G&W ELECTRIC SPECIALTY CO.
3500 WEST 127TH ST. • BLUE ISLAND, ILL.

D581

Building Stairwell Wiring Saves $20,000

FRANK R. McSHANE, Power Service Engineer, Commonwealth Edison Co, Chicago, Ill.

When the building manager of a Chicago office building wanted to install air conditioning, he had to choose between a central system with its ducts and wiring, or a number of window units, which required wiring only. He chose the window units. He then simplified the resulting wiring job by placing conduit in stair wells for the wiring risers. Here's how:

Risers installed up the stairwells were 500 Mcm conductors in 3½-in. conduit. By sending the risers up the stairwells rather than through the building floors, he saved drilling holes through reinforced concrete at each level. It also eliminated a space problem for distribution panels where the rising wire would normally have been installed. Estimated savings are put at $20,000.

Each of the building's 24 floors is sub-metered. No. 12 branch circuits connect meter and distribution panel with air conditioning units. There are 243 window one-ton units in the building, an average of slightly more than ten units a floor.

Appearance of the conduit and panels in the stairwells is not objectionable, but they will have to be enclosed to comply with city fire regulations.

U. S. Steel Films 'Dream Kitchen'

United States Steel Corp has come up with an appliance-boosting film called "Practical Dreamer." Aimed at increasing the sale of appliances (and steel, of course), the 13½-min, 16-mm color film takes its name from a housewife's dream, in which she learns about designing her new kitchen.

The film has another purpose: to pictorialize U. S. Steel's "Kitchen Planning Book," which explains some of the fundamentals of kitchen design . . . appliance arrangement, housewife's needs, space, etc.

To be distributed first to TV stations, it will be available free to utilities after April 1, 1958, from the company's Film Distribution Center, 525 William Penn Place, Pittsburg 30, Pa. Utilities wanting copies of the Kitchen Planning Book, available now, should write R. C. Meyers, Advertising Director, at the same address.

EEI Announces Kits for Housepower Contest

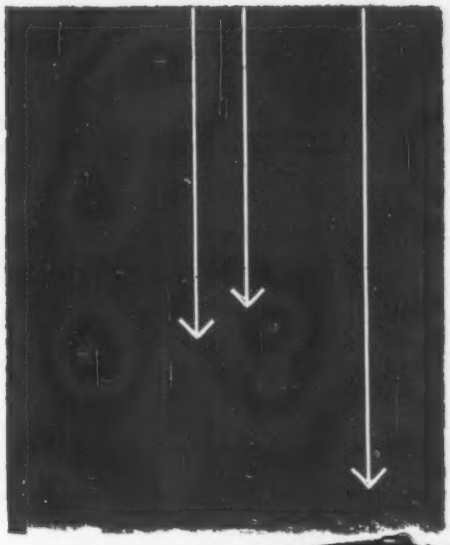
Edison Electric Institute has announced that promotion kits for the forthcoming $100,000 Housepower Contest are available. Kits contain promotion materials and local tie-in ideas for utilities, including window banners and counter cards. Mats and reproduction proofs also are available.

Contest which began Feb 1, will get special emphasis during National Electrical Week, Feb. 9-15, and will continue through February, March and April. It is expected to get national advertising coverage for more than 10 million readers.

A cartoon showing a low housepower situation is the focal point of the contest. Contestants are asked to write a caption for the cartoon, and prizes will be given for aptness, originality, and humor. EEI is donating $10,000 in cash. The remaining $90,000 will be given in electrical appliances by 30 manufacturers.

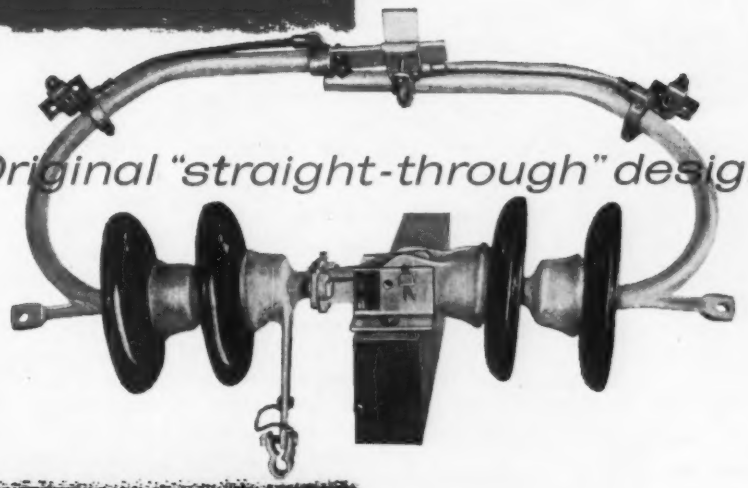
In addition to the kits EEI is offering individual mailing and handout pieces, which are broadsides containing entry blanks and full details for entering the contest. There is also a special 56-page booklet called "151 Ways to Live Better Electrically with Full Housepower," from Living for Young Homemakers' New Guide to Home Planning and Remodelling.

(*More selling on page* 86)



Only KPF switches look like this

simple, attractive, trouble-free, proved in 50 years service



Original "straight-through" design

You always know when a power company is using KPF switches. (As more and more are today). You can't miss the clean, functional "straight-through" appearance of KPF phase units. This same design simplicity that produces pleasing pole top appearance also insures all-weather operating ease. KPF switches have no temperamental mechanisms to malfunction, freeze, lock, need lubrication or wear out.

KPF switches have proved their dependability in over 50 years service on major utilities. Make a test installation of the original, "straight-through" air break switch on your system this month.

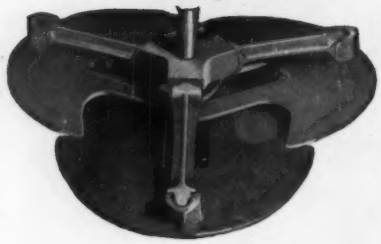
Write direct for catalog.

KPF ELECTRIC COMPANY
Dept. E. 1624 E. Alpine Avenue
Stockton 5, California

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life



● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all other. Available two-way, three-way, four-way, and cone types. Write for facts.

AN EXCLUSIVE
EVERSTICK
FEATURE
Exclusive Everstick nut housing Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO
FAIRFIELD, IOWA

Five Heat Pumps Get Six Stars

Maryland drive-in movie finds they fill the bill by heating and cooling its snack bar in the middle of the parking lot

ARTHUR C. CRAWFORD, Commercial Engineer, Potomac Electric Power Co, Washington, D. C.

Movie-goers and movie operators endorse the heat pump. It makes move-going more pleasurable, and the operators' profits fatter.

Queen's Chapel Drive-In in Hyattsville, Md., wanted to build a restaurant-snack bar. But there were obstacles, six of them in fact. Here's how they were solved by five-ton heat pumps:

Six Problems—Six Stars

1. The snack bar building had to be in the center of the parking area to be accessible to all cars. It had to be low, which meant no chimney. It had to have 10,000 sq ft of floor space and a large glass wall area. The soil was such as to preclude a dug-out basement, which was undesirable also because it would boost cost considerably.

2. With a large number of people crowding into the snack bar during the short break between movies, the air-conditioning problem becomes one of cooling, even in winter. But when the crowd leaves, the space has to be heated. It would be necessary even to cool one part of the building and heat another simultaneously.

3. Cooling towers on the roof would obstruct the view; placed on the ground, they would take up revenue-producing car space.

4. The space required for fuel-fired equipment was saved. On this score alone, the owners figured they saved 12% of the cost of the cheapest conventional equipment.

5. Maintenance was cut to a minimum, ie, no cooling tower draining, pump-downs, or start-overs.

6. Queen's Chapel Drive-In is using energy at the lowest step in the rate structure. Operating cost the first year has been less than that estimated for other fuels, and even less than the estimate by the installing dealer (see table).

Demand, Consumption and Operating Cost (Five 5-Ton Heat Pumps)

Date	Maximum Demand Kw	Kwhr	Cost at Average 2c	No. Degree-Days	Kwhr per Degree-Day per M Cu. Ft.
August '55	44.2	15,500	$310.00	....	....
Sept	36.5	3,000	61.60	....	....
Oct	....	.....	.....	....	....
Nov	42.2	6,400	128.00	377	.189
Dec	59.5	16,360	327.20	892	.204
Jan. '56	69.5	22,250	444.80	1052	.235
Feb	69.1	15,700	314.00	790	.221
March	65.3	10,480	209.60	627	.186
April	49.9	1,880	37.60	328	.064
May	44.2	1,270	25.40	133	.106
June	42.2	6,190	123.80	....	....
July	44.4	12,480	249.60	....	....
TOTALS...		111,520	$2,231.60	4199	

FLORIDA'S GROWING POWER RESERVE

To meet Florida's constantly-mounting demand, Florida Power and Light Company is continuing a substantial program of expansion.

One new unit capable of producing 160,000 kilowatts was added to its Lauderdale Plant last fall. Another of equal size is scheduled for initial operation this spring.

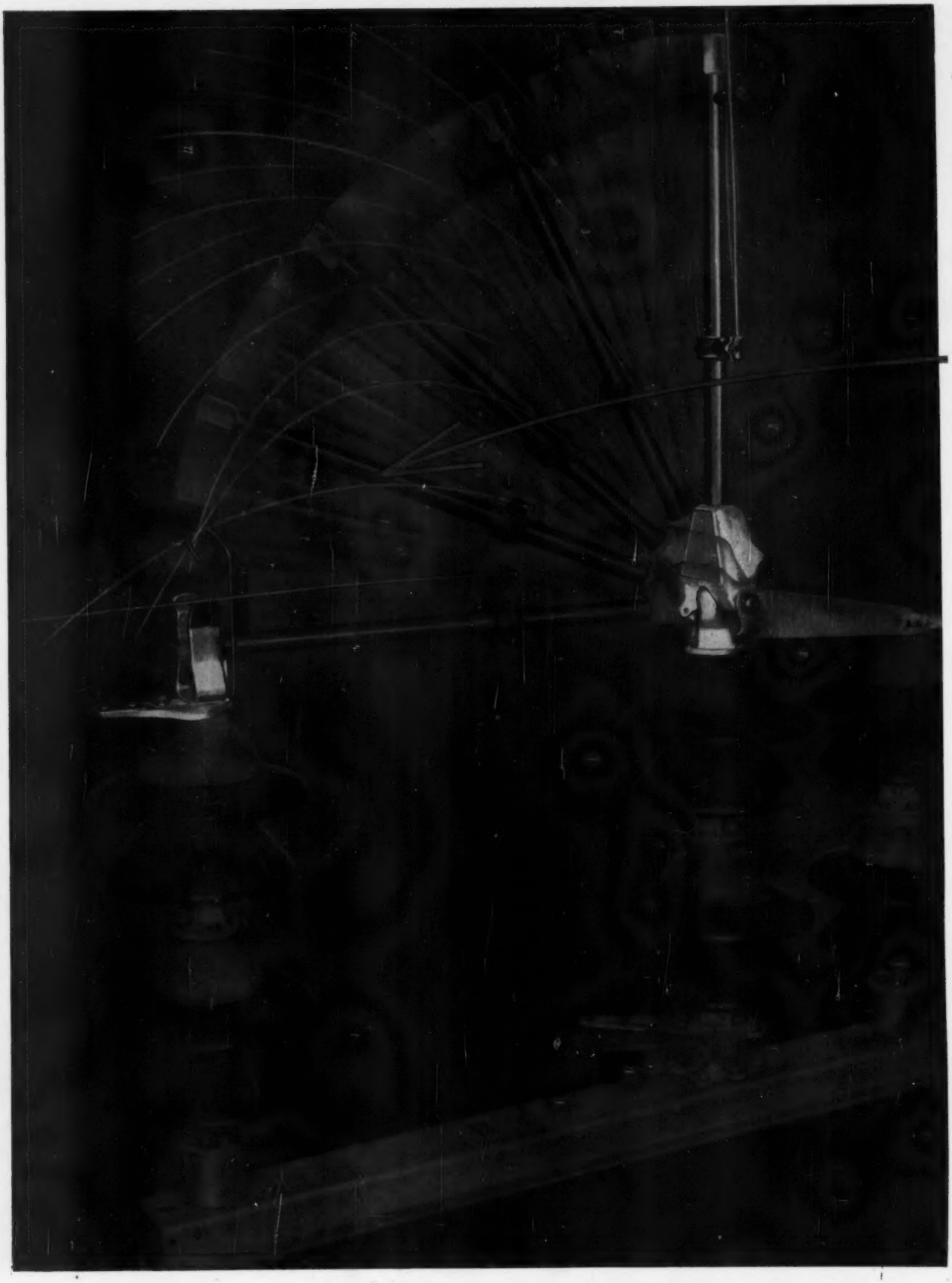
A new steam-electric plant will be built at Port Everglades, with completion dates in 1960-1961. Rated capability will be 480,000 kilowatts with planned eventual maximum capability of two millon kilowatts.

Bechtel is responsible for engineering and construction both at Fort Lauderdale and Port Everglades.

BECHTEL

Engineers and Builders for Industry

BECHTEL CORPORATION — SAN FRANCISCO · Los Angeles · New York · Houston — CANADIAN BECHTEL LIMITED · Toronto · Vancouver



A quarter century of interrupter switch research...

produces another tool to solve your power switching problems

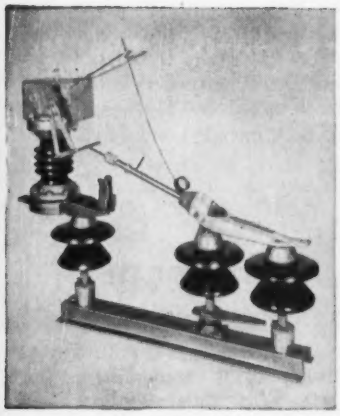
Basic research in the theories of arc interruption has been carried on at the Westinghouse High Power Lab since the early 30's to establish principles useful in developing our modern disconnect switches.

Latest in the line of Westinghouse interrupting switches is the quick-break arcing horn . . . to quickly and safely interrupt small loads, magnetizing or charging currents. The line is available for adding to the Type V or RL in ratings from 7.5 to 69 kv. (Unit at left is rating 69 kv.) With the positive snap action of the quick-break arcing horn, to prevent arcing, primary circuits can be safely interrupted under load without endangering personnel or equipment.

For complete details about the best air break switch to solve your circuit interruption problem, call your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

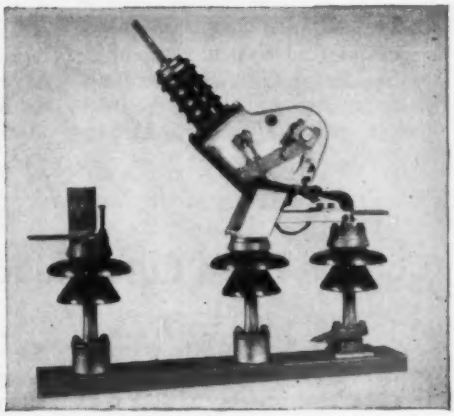
J-60939

YOU CAN BE SURE...IF IT'S Westinghouse



Continuing research and testing at Westinghouse has contributed much to the art of arc interruption. The VLB switch developed in 1951 introduced SF_6 to extend load break capacities to 161 kv.

Earlier research, in 1940, resulted in the design of the LCB switch with boric acid fuses utilizing the De-ion® principle . . . having ratings from 5 through 15 kv on indoor applications.



An early model air break switch Westinghouse was working with in the 1930's to improve the arc-extinguishing techniques known at the time . . . one result: high pressure contact jaws.

Providing 115-ft-c in print shop press room . . .

Lighting Trims Inventory Needs

WAYNE F. MULCOCK, Consultant, Business Development Dept, Utah Power & Light Co, Salt Lake City, Utah

A reduction in paper stock requirements is attributed to the modern, 115-ft-c lighting installation in the press room of the Paragon Press' new Salt Lake City plant. According to President A. G. Wallin, the cleanliness practices fostered by the shadowless, evenly distributed, high-intensity lighting have eased stock accounting and permitted the firm to lower the amount of on-hand reserves required. Moreover, the new lighting has improved working conditions, produced a cleaner shop, and boosted employee morale.

The company recently moved to a new $\$1/2$-million plant, one of the largest printing establishments in the Intermountain area. Most prominent feature of the plant is the high-level, high-quality lighting. The 115-ft-c illumination in the main press and composing rooms permits efficient work throughout the room without supplementary lighting. Eye strain, so common in many print shops, has been lowered significantly, with a corresponding increase in employee morale and a reduction in turnover.

The lighting system uses the latest industrial fluorescent fixtures, with top-slotted reflectors which allow about 10% of the light to bounce off the light-colored ceiling, thereby reducing overhead contrast. The installation consists of 57 3-lamp 8-ft fixtures, mounted in four continuous rows, about 10½ ft apart. Total lighting load in the press room is 17.1 kw.

With better lighting, cleanliness follows naturally. Compositors and pressmen show great pride in the shop and this is reflected both in the quantity and quality of the output. White uniforms are furnished for the men to enhance the effect of the lighting and plant layout.

Since the move to new quarters, business has improved appreciably. Although the company can not determine how much of the gain is due to the new lighting, their advertising campaigns have featured photographs of the well-lit facilities and they have conducted private tours to show off the installation.

The lighting was engineered by Don Black, Graybar Electric Co, and installed by Midwest Electric Co, both in Salt Lake City.

Coaxial Feed Cuts Induction Heater Losses, Interference

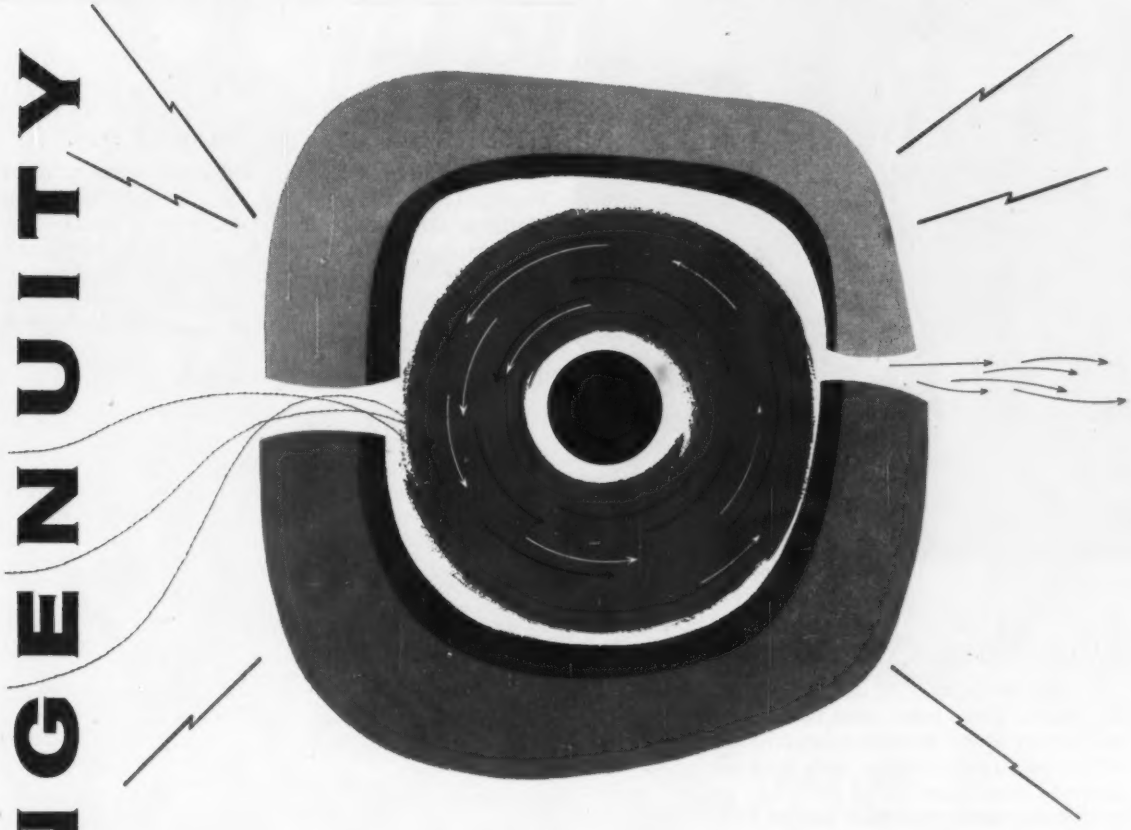
Coaxial cables used to transmit power from high-frequency induction-heating generators to work coils have cut power losses, provided better control of heat application, and practically eliminated r-f interference at the Hughes Aircraft Co in Los Angeles. The 3.125-in. diam. cables carry a current of 125 amp with a voltage potential of 1,980 v between the two conductors. Length of the line, including elbows and other fittings, is approximately 20 ft. From an operating standpoint, the voltage drop in the feeder is negligible.

The induction heaters heat up the metal elements in cathode ray tubes while the air is being pumped out of the tube under high vacuum. When the tube is evacuated, the end is sealed. With induction heating, metal components can be brought to red heat without melting the glass envelope. Power is supplied by two 450-kc, 5-kw transmitters, each serving two loads alternately on a time-sharing basis.

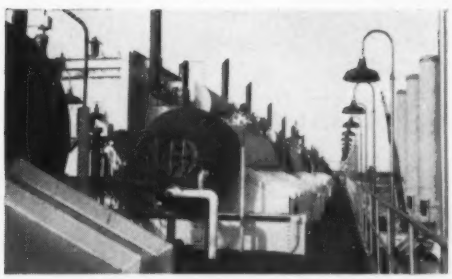
The effective shielding on the coaxial cables permits Hughes to operate the high-frequency heater in close proximity to the Los Angeles International Airport, their own electronics research department, and other neighboring electronic firms without producing r-f interference.

call KE for plant expansion or new facilities

INGENUITY



has made KE a major builder of power facilities



A 475,000 KW power generating facility, engineered and built by KE.

Faster construction, more efficient operation, lower costs—these are benefits Kaiser Engineers' ingenuity has brought to power projects ranging from America's largest dam to power installations for industrial plants.

Experienced KE engineers can take your power idea from a gleam in your eye through start-up—from economic analysis through operator training.

Whether your future power needs are thermal or nuclear, call KE. Let KE's ingenuity produce real time and money savings for you.

KAISER ENGINEERS engineers—contractors
Contracting since 1914

Division of Henry J. Kaiser Company • Oakland 12, California • New York, Pittsburgh, Washington, D.C., Buenos Aires, Calcutta, Dusseldorf, Montreal, Rio de Janeiro, Sydney, Tokyo

4381

New Equipment

Insulated Crane Basket . . .

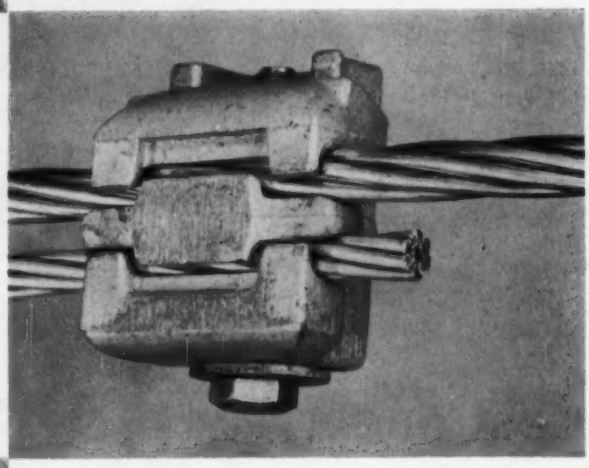
. . . can withstand 12.5-kv continuous contact, 50-kv brush. The fiber glass unit is attached to elevator platform through six insulators, four at the bottom and two at the side. Basket is 48-in. high, with inside base 16 x 16 in. and 24 x 24-in. top. Basket stays horizontal at all times, and does not tip. It can be easily removed to permit use of crane for normal loading, lifting, and unloading.

Teale & Co, Box 308, Omaha, Neb.

One-Piece Connector . . .

. . . comes in six sizes for cables from No. 8 through 397 Mcm. Three larger sizes have soft, pure aluminum center spacer for high conductivity contact with individual strands; smaller sizes have cable-to-cable contact. Interlocked design maintains tap and main groove alignment for better contact and simpler installation. Massive construction assures cool contact. Units are chemically cleaned and pre-inhibited to reduce contact resistance, prevent corrosion.

Anderson Electric Co, Box 2151 Birmingham, Ala.



Air Motor Jack . . .

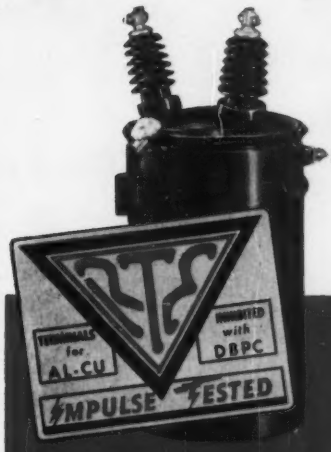
. . . can pull 90-ft, Class 2 pole from dry earth, has 20-ton capacity and 18-in. lift. With pole held erect by truck-mounted A-frame, chain is stretched over lift on jack cap and attached to pole base. Heavy duty rotary air motor powering jack requires 90-psi pressure from compressor truck.

Jack will not lower until motor is reversed. Automatic shutoffs on top and bottom provide extra safety. Designated No. 1720 RGL, jack is 28-in. high, weighs 240 lb. It can be rolled into position on semi-pneumatic wheels.

Joyce-Cridland Co, 2027 E. First St, Dayton, Ohio

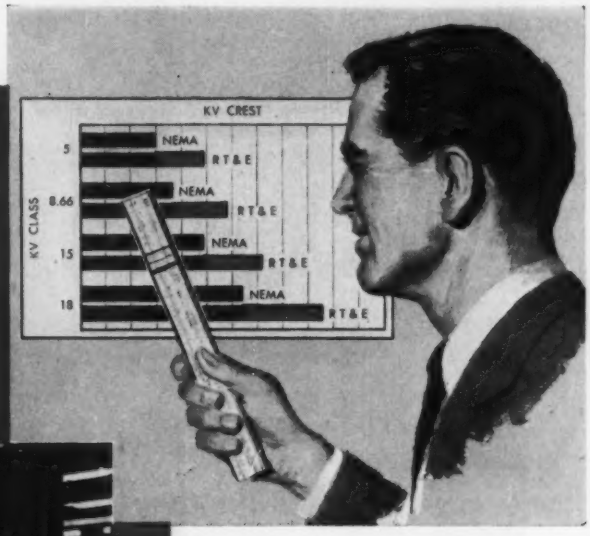
(*More New Equipment on page* 96)

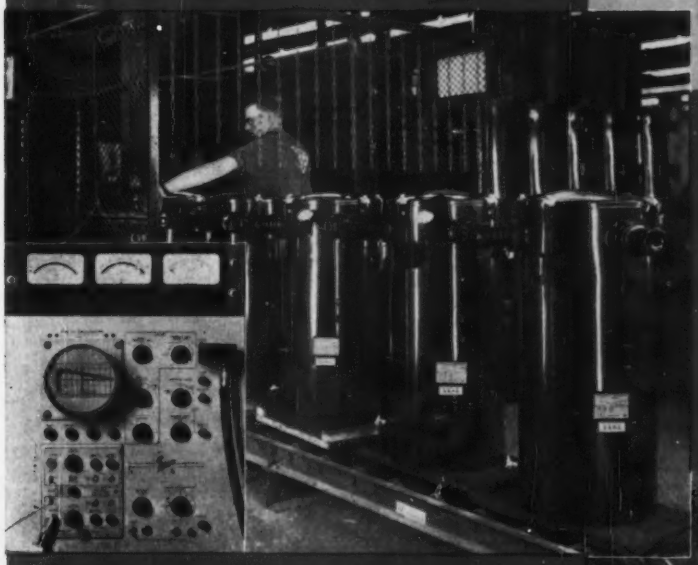
IMPULSE TESTED



DESIGN

High impulse strength in transformers is not attained by accident; it must be considered from the very beginning of design. Such is the case at R T & E, where transformer design is based on impulse withstand levels approximately 50% in excess of NEMA standards.





TESTING

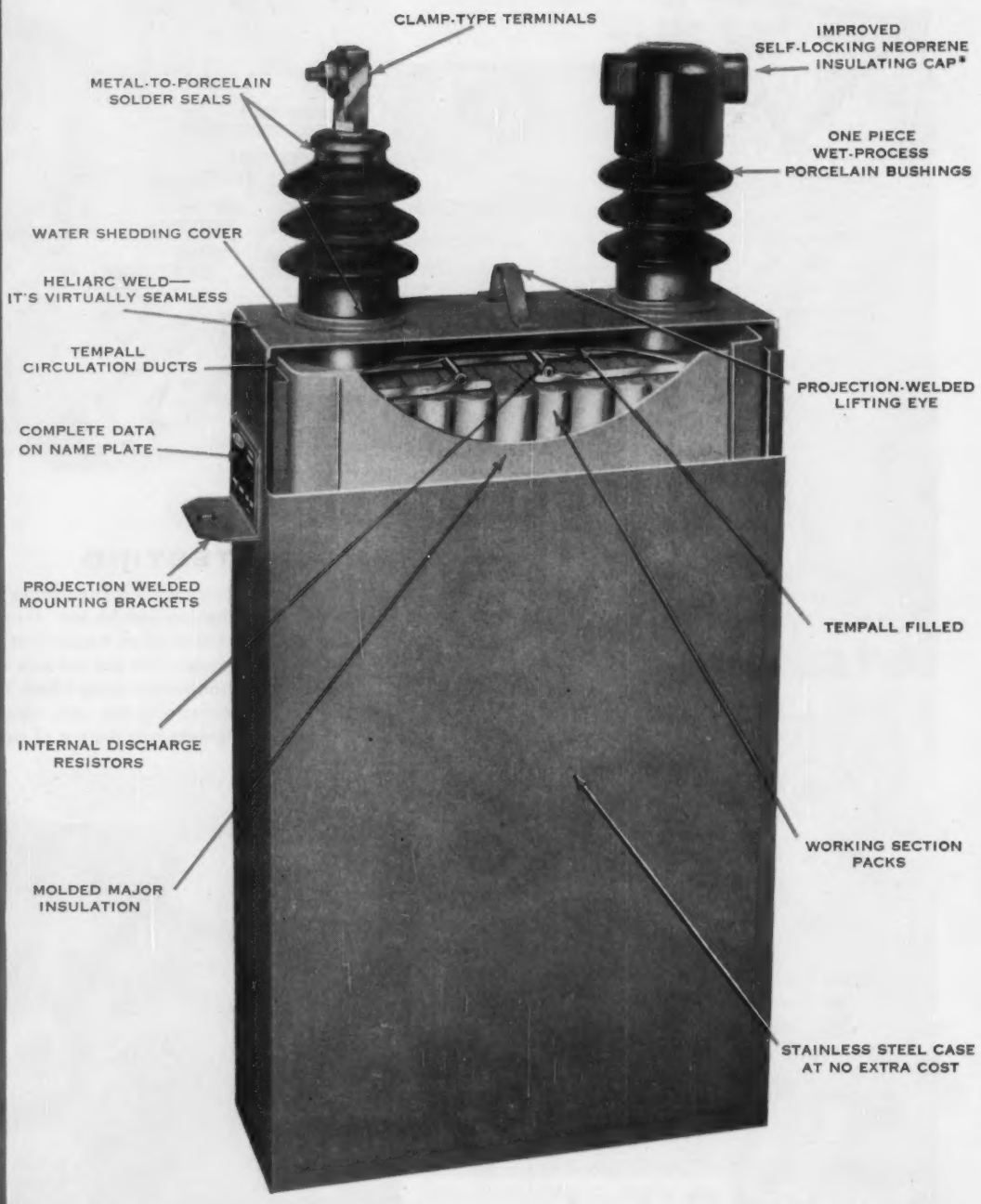
Every R T & E Transformer receives an "on the line impulse test" through use of the most modern equipment and methods known. This test not only insures that the transformer meets NEMA impulse level requirements but also rejects those transformers that are not of maximum quality.

OPERATION

Naturally, the ultimate in testing is provided "on the system", where nature subjects the transformer to the most rigorous tests. R T & E Transformers have been thoroughly proven in operation in every climate of the U. S. They have been awarded the invisible seal of customer satisfaction, proved by a growing list of customers who specify R T & E.

R T & E CORPORATION
WAUKESHA, WISCONSIN
Helping provide power for America

TOBE invites you to lo



ok inside the capacitors . . .

BEFORE YOU BUY A HOUSE, you look a lot farther than the color of the bathroom tile. You find out how the house is really constructed!

It's smart to be just as thorough when you buy capacitors.

Here are other TOBE *features which assure efficiency and long life in* TEMPALL CAPACITORS:

- *Constant quality control of individual units during manufacture, processing and tests.*
- *Each unit visually inspected during manufacturing cycle to insure complete impregnation.*
- *Special* TOBE *assembly control mechanism results in greater product uniformity.*

Because of low losses resulting from TOBE'S advanced engineering design and manufacturing technique you get more correction for your capacitor dollar.

It will pay you to investigate TOBE capacitors today. Available in all standard ratings. In single units, racks, pole assemblies and complete cabinets ready for field installation and energization. Write Tobe Deutschmann Corporation, Norwood, Massachusetts or phone Norwood 7-2620, collect for further information today.

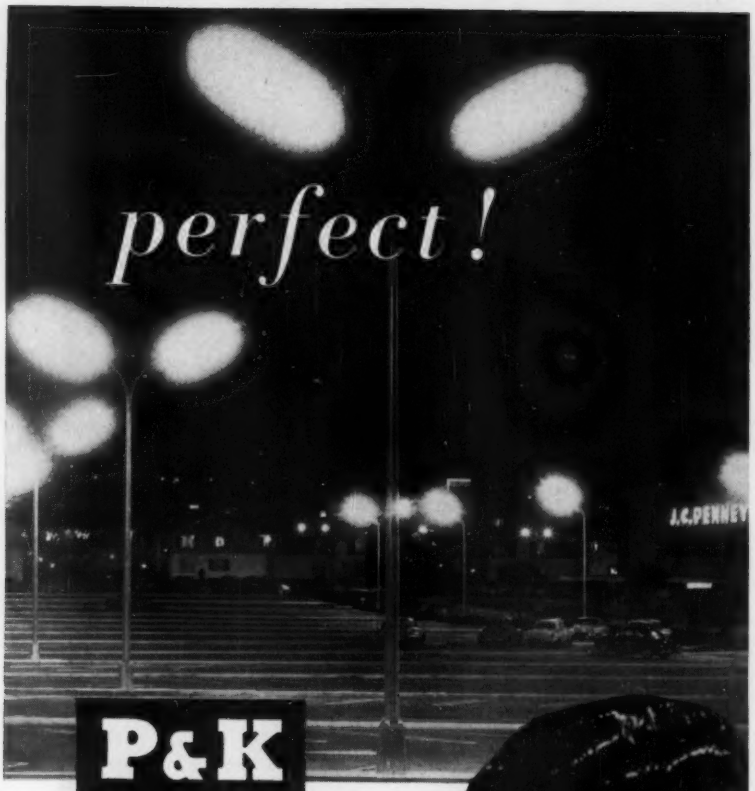
LOOK TO TOBE FOR PROGRESS

Since 1929 persistent research, trustworthy engineering, rigid production standards.

TOBE

TEMPALL CAPACITORS

*PATENT PENDING

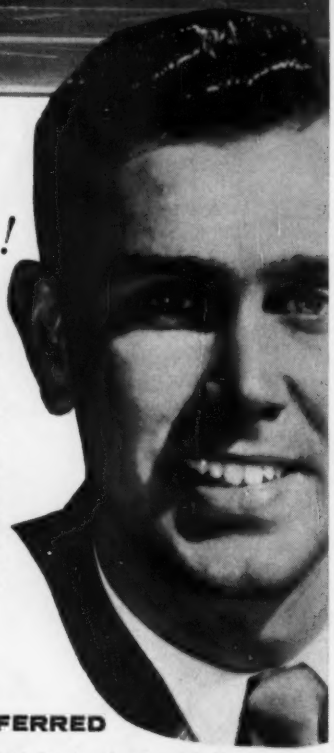


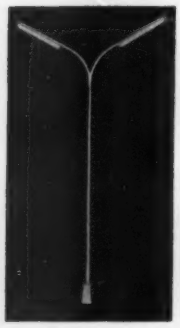
P&K

PACKAGED LIGHTING UNITS

make the job easier!

To complement the modern architectural style, Westlake Shopping Center, in California, chose P & K packaged lighting units, with the entire unit supplied by this one reliable source. It made their job so much easier. With so many P & K groupings to choose from—davit or straight standards, or more artful shapes—and a choice of three light sources, incandescent, fluorescent, or mercury vapor—Westlake, in effect, customized their installation with standard components. Needless to say, they enjoy all the advantages of P & K aluminum lighting standards, for, in addition to their good looks, they offer easy installation and no maintenance.
For more facts, send for Catalog L-2.





WESTLAKE PREFERRED

The P & K 32-foot davit style standard, with the P & K LUXaire—a weathertight fluorescent fixture that allows for convenient lateral adjustment and easy relamping.

P&K

PFAFF & KENDALL
84 FOUNDRY ST., NEWARK 5, NEW JERSEY

Weather Shields . . .

. . . for dry-type distribution transformers DS-3 and DT-3 are available for all 600-v ratings up to 300 kva. Each transformer requires one pair of heavy-gauge steel shields. Designed to keep out driving rain and snow, they may be obtained separately and installed in the field by removing four panel bolts.
Westinghouse Electric Corp, P. O. Box 2099, Pittsburgh 30, Pa.

Transformer Tester . . .

. . . is portable instrument for checking voltage ratio and polarity of power and distribution transformers. Trans-R-Meter weighs only 5 lb and can be used in field or shop wherever, 120/240-v supply is available to energize transformer high voltage winding.

Two windings of transformer form one-half of four-arm bridge. A resistance potential divider in the instrument constitutes the other two arms. Null detector meter indicates when arms are in balance. Transformer ratio can be read directly from divider dial scale.
HD Electric Co, 760 Osterman Ave, Deerfield, Ill.

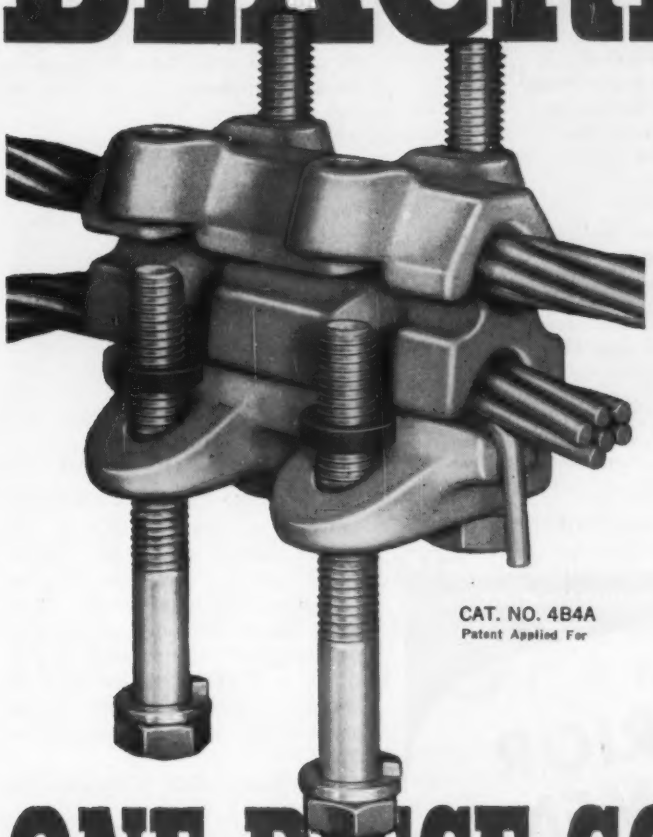
Arc Welder . . .

. . . for either ac or dc inert gas welding has both transformer and rectifier. Dc may be either straight or reverse polarity. Unit includes magnetic line switch and removable rheostat for remote control. Current overload device protects both transformer and rectifier; thermostat pro-

(*Continued on page* 98)

It's New! Installs quicker...easier

BLACKBURN



CAT. NO. 4B4A
Patent Applied For

It's here... a heavy duty one-piece 4-bolt connector with all the electrical and mechanical advantages of a U-bolt connector... yet much easier to install.

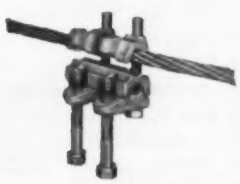
No bothersome nuts, washers, housings, spacer to take apart and assemble. Just three quick, easy steps and installation is completed.

Housings are of non-copper-bearing aluminum alloy. Spacer of soft aluminum pig protects conductor, aids conductivity. Spacer treated with heavy coating of oxide inhibiting compound. Hardware is high strength aluminum alloy completely alumilited to prevent seizing.

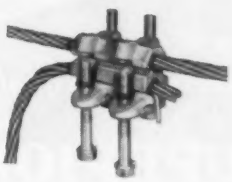
WIDE RANGE...
Accommodates conductors—2/0 to 397.5 ACSR—3/0 to 477 MCM.

ONE-PIECE CONNECTOR

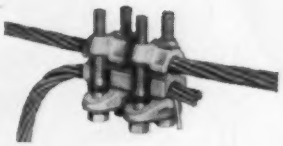
HERE'S HOW EASY THE NEW 4-BOLT CONNECTOR IS TO INSTALL



Unscrew the two free bolts contained with neoprene washers and hang over main.



Insert tap wire.



Tighten and you have the ultimate in a good connection.

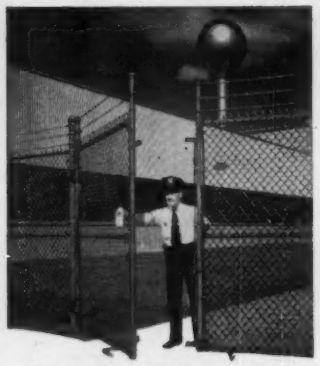
Available through electrical wholesalers everywhere

JASPER BLACKBURN CORPORATION

1525 WOODSON RD., ST. LOUIS 14, MO., WYdown 3-9430

PAGE chain link FENCE

America's First Wire Fence—since 1883



Why a PAGE Fence is the RIGHT Fence for YOU...

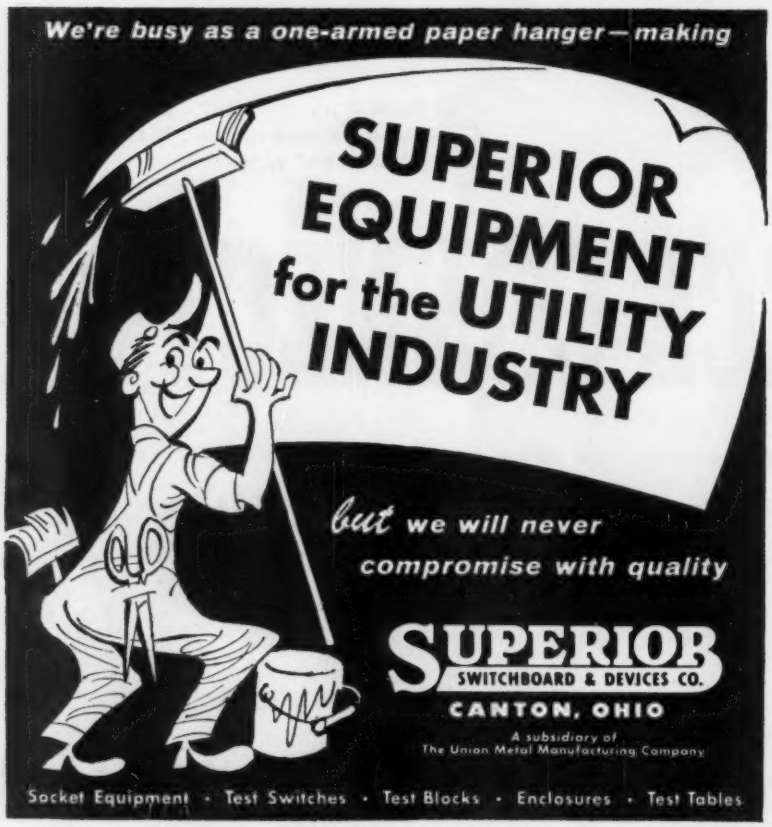
You can choose from—

- **—8 Fence Styles**
- **—8 Fence Heights**
- **—4 Fabric Metals**
- **—2 Types Metal Posts**
- **—Top Rail or Top Wire**
- **—Single or Double Extension Arms**
- **—6 Gate Styles, Many Widths**

• Your protective PAGE FENCE can be comprised of units that best meet your individual needs or preferences. All are quality-controlled by PAGE from raw metal to finished units ready for assembling. Your PAGE FENCE will be planned and expertly erected to meet engineering standards by a reliable, long-experienced firm permanently located in your vicinity, knowing local conditions affecting fence, and having lasting interest in every fence it installs. For illustrated PAGE information and name of nearest firm...

Write to PAGE FENCE ASSOCIATION in Monessen, Pa., Atlanta, Bridgeport, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia or San Francisco.

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.

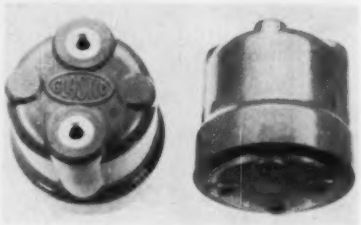

We're busy as a one-armed paper hanger—making
SUPERIOR EQUIPMENT for the UTILITY INDUSTRY
but we will never compromise with quality
SUPERIOR
SWITCHBOARD & DEVICES CO.
CANTON, OHIO
A subsidiary of The Union Metal Manufacturing Company
Socket Equipment • Test Switches • Test Blocks • Enclosures • Test Tables

Arc Welder . . .

(*Continued from page* 96)

vides additional protection for rectifier. Both devices open the primary contactor.

Model AD-264-S is rated 200 amp at 40 v, has welding range of 12 to 330 amp ac or 12 to 360 amp dc. Model AD-364-S is rated 300 amp at 40 v, with welding range of 12 to 420 amp ac, 12 to 400 amp dc.
Hobart Brothers Co, Hobart Sq, Troy, Ohio



5-Kv Standoff Insulator . . .

. . . made of fiber glass reinforced polyester weighs only 1.3 lb, has impact strength of 3 ft-lb. Dimensional accuracy eliminates need for shimming and hand fit-up. Maximum height variation is ±0.010 in; mounting surfaces are parallel within 0.010 in T.I.R. Unit has high resistance to arc erosion and thermal shock caused by high current power flashover.
Glastic Corp, 4321 Glenridge Rd, Cleveland 21, Ohio

Tape Input-Output . . .

. . . for digital computers has transfer rates up to 90,000 six-bit characters per sec. Entire unit, comprising tape handler, read-write heads, electronics, and special magnetic tape fits into 60-in. space on 19-in. relay rack. FR-300 tape handler operates at 150 in. per sec, records two six-bit characters side by side on 1-in. tape. Reliably repeatable start-stop time of less than 1.5 millisec reduces need for buffer storage. Electronics circuit is completely transistorized.
Ampex Corp, 934 Charter St, Redwood City, Cal.

(*More New Equipment on page* 102)

NEW FROM VICTOR!

NO. 961 FOGBOWL SUSPENSION

Specially designed for fog and smog contaminated areas, this brand new product of VICTOR research was created to satisfy a critical need. The new No. 961 suspension has the *lowest* leakage current and the *lowest* radio interference level of any other type or make of fogbowl suspension insulator used in contaminated areas.

Low surge and leakage currents contribute to many desirable advantages of this insulator—particularly the elimination of wood cross-arm burning. These exceptional features have been proved not only in VICTOR'S own electrical laboratory, but by extensive service on lines in locations where contamination is a serious hazard.

If your service depends on protection against fog, smog and industrial contamination, here is your answer—VICTOR'S new No. 961 Fogbowl Suspension. You can't buy better—at any price!

VICTOR INSULATORS DIVISION

I-T-E CIRCUIT BREAKER CO., INC. • VICTOR, N.Y.

GOVERNOR MOTOR ACTUATOR

receives a command signal from the Load Frequency controls and operates the motor to make generator output agree with the command request. This unit can be used with series or shunt wound motors at 125 or 250 volts dc. Transistorized amplifier and saturable reactors are used throughout. There are no vacuum tubes or relay contacts used in the circuitry. Power supplies for both measurement and control functions are self-contained.

RATE LIMITER

restricts the rate of change in generation to conform to safe boiler and turbine conditions. *It Senses the Rate at Which Generation Changes* and permits fast rates of change over an allowable narrow band but restricts larger changes to a predetermined number of MW./Min. Flexibility is provided so that this device can be used with any boiler-turbine-generator combination.

These 2 new exclusive features give your Honeywell load and frequency control system extra reliability

The many advantages you get with Honeywell load and frequency control systems are due in part to important new features like the tubeless governor motor actuator and the rate limiter. These advantages—continuous, accurate high-speed control . . . low maintenance . . . suitable for all operating conditions—add up to unmatched reliability and better control.

Gain the day-to-day benefits of a Honeywell system to control network interchange, to simplify system load dispatching, regulate frequency and maintain economic loading of generation for maximum operating economy. Call your nearby Honeywell field engineer for details. He's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Products Group, Brown Instruments*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

H HONEYWELL *First in Controls*

ELECTRIC PLANT
NEWS

Model 205AJ-1P
2,500 watts A.C. Carrying frame, recoil starter, outlet box and pilot light standard equipment.

Power company gets double use from Onan Plants

Portable Onan units handle maintenance jobs and standby service

This Onan Plant gets a good workout nearly every day on maintenance and construction jobs . . . providing plug-in power for electric tools and lights.

It's a big time-saver . . . but it's also a life-saver when power is cut off from a farm or home. Then the Onan Plant is rushed out to provide emergency electric power for such essential equipment as milking machines, lights, water system and appliances.

This kind of extra service keeps your customers happy and builds goodwill for you. Many dual-purpose units available . . . 500 to 10,000 watts A.C. Other units up to 75KW.

Write for complete specifications

D. W. ONAN & SONS INC.

2822A University Ave. S. E., Minneapolis 14, Minnesota

ELECTRIC PLANTS • AIR-COOLED ENGINES • GENERATORS • KAB KOOLER

INDIANA STEEL & WIRE COMPANY MUNCIE, INDIANA
Crapo Galvanizing

Signs along the lines of *Crapo* GALVANIZED STEEL STRAND PERFORMANCE

For dependable performance . . . insist upon *Crapo* Galvanized Steel Strand. Superior tensile strength, combined with long-life, ruggedness and workability, makes *Crapo* Steel Strand first choice for guys, messenger and overhead ground wire.

The famous *Crapo* galvanizing process provides dependable protection for the steel, prolongs the expectant life of the strand.

- Low maintenance cost
- Laboratory tested and controlled quality
- Meets highest quality standards
- A size and grade for all practical needs
- Contact your *Crapo* Jobber Today!

INDIANA
STEEL & WIRE CO., INC.
Muncie, Indiana

MINERALLAC
"PULL-IN"
COMPOUND
No. 100

LISTED and APPROVED by UNDERWRITERS LABORATORIES

For Rubber, Synthetic, Plastic or Lead-Covered Wires or Cables

Approved by Underwriters Laboratories for lubricating wires and cables to facilitate pulling them into conduits. Not injurious to wire or wire covers. Free of objectionable odors. White in color. Will not drip or run. Conveniently packed in pint, ½ gal., gal. and 5 gal. cans. Available through your electrical jobber.

MINERALLAC ELECTRIC COMPANY
25 North Peoria Street, Chicago 7, Illinois

MINERALLAC

Hydraulic Crane . . .

. . . capacity is boosted from 10 to 12 tons in redesign of H-5 Hydrocrane. Unit now has three independent hydraulic circuits, each individually controlled, plus more powerful boom hoist and high-alloy steel hoist standards. Enclosed pump drive is gear driven and runs in oil. Addition of third hydraulic unit provides faster coordination of crane movements while maintaining precision control.
Bucyrus-Erie Co., South Milwaukee, Wis

Two-Channel Intercom . . .

. . . for noisy industrial areas requires no central amplifier or control equipment. Maintenance and installation are simplified because GTC system comprises only telephone-type handsets and loudspeaker assemblies, connected by two pairs of No. 18 unshielded wire. System needs 115-v power source.

For party line operation, only handsets are used; for paging, both handsets and loudspeakers. Indoor units are dust-tight; outdoor units, weatherproof. Handset has adjustable output level and sidetone; loudspeaker, adjustable volume and frequency response. Each handset and speaker has individual plug-in printed circuit transistor amplifier.
Dept GTC, Gai-Tronics Corp, Reading, Pa.

NATVAR in Switzerland!

The world renowned firm of Secheron in Geneva has been using Natvar 400 tape to great advantage for years.

The excellent electrical and physical properties of Natvar 400, its exceptional uniformity and ease of application, have made it the choice of leading manufacturers of electrical apparatus and equipment both in this country and abroad.

If you are a user of flexible electrical insulating materials, it will pay you to get in touch with your Natvar distributor or with us direct.

↑ 3000 kva, 6300 volt, 500 rpm 3-phase alternator built by Secheron of Geneva for installation in Angola.

← Coil ends are neatly wrapped with Natvar 400 extruded vinyl tape for dielectric and mechanical protection.

Natvar

Natvar Products

- Varnished cambric—cloth and tape
- Varnished canvas and duck
- Varnished silk and special rayon
- Varnished—Silicone coated Fiberglas
- Varnished papers—rope and kraft
- Slot cell combinations, Aboglas®
- Isoglas® sheet and tape
- Isolastane® sheet, tape, tubing and sleeving
- Vinyl coated—varnished tubing and sleeving
- Extruded vinyl tubing and tape
- Styroflex® flexible polystyrene tape
- Extruded identification markers

Ask for Catalog No. 24

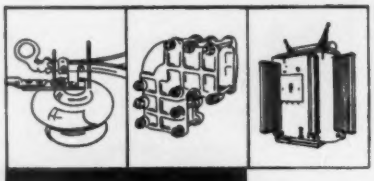
NATVAR CORPORATION

FORMERLY THE NATIONAL VARNISHED PRODUCTS CORPORATION

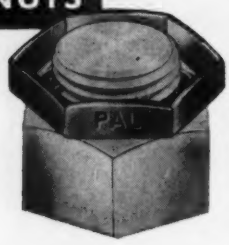
TELEPHONE FULTON 8-8800 — CABLE ADDRESS NATVAR: RAHWAY, N. J.

221 RANDOLPH AVENUE • WOODBRIDGE, NEW JERSEY

Keep Nuts Tight
on all bolted assemblies



Apply
PALNUT
LOCK NUTS



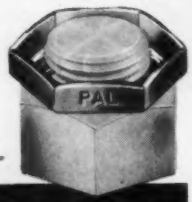
PALNUT Lock Nuts apply so fast, lock so dependably . . . you can specify them for every nut-and-bolt assembly, at negligible cost. Maintenance is reduced on mechanical assemblies—full conductivity assured on electrical connections.

PALNUT Lock Nuts may be used on new or existing equipment. Easily removed and re-used when servicing. Require only 3 bolt threads. Available in Parkerized and hot dip galvanized steel; also silicon bronze.

Send for free samples and Bulletin #577

THE PALNUT COMPANY

51 Glen Road
Mountainside, N. J.



PALNUT
TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost

Impedance Sets Cost

(*Continued from page* 69)

the low-voltage winding. The co-ratio (R) is given by formula (3). All terminal reactances are presented on the output kva base. For the most economical design, the values of reactance (H-X) are given by formula (4), reactance (X-Y) by (5), and reactance (H-Y) by (6).

As for a two-winding transformer, minimum standard values of reactance result in the more economical design. Special reactances affect the design in two ways. First, just as in two-winding transformers, they affect overall size, weight, and loss ratio; second, they require non-standard arrangement of windings to get a special combination of reactance between pairs of windings.

Almost any combination of values can be obtained by using improved methods of design and reactance calculation. However, the more special these values are, the more time is required to design and build the transformers. The other electrical and physical characteristics, such as insulation, electromagnetic forces, and cooling, may be less desirable.

Six Windings Shown

Various winding arrangements are shown in Fig 4. The common, most economical, three-winding arrangement is represented by (A), with (B) showing the low and intermediate windings interchanged to obtain different impedance relations. This arrangement is as economical as (A) if insulation classes of windings X and Y are less or equal to the low-voltage BIL in the table. Another special arrangement (C) sometimes is used deliberately in large kva transformers to obtain low impedance between the high-voltage and the other windings.

The design represented by (D) makes reactances (H-X) and (H-Y) very high. It can be used for split low-voltage winding design. In arrangement (E) reactances (H-X) and (H-Y) are equal and (X-Y) low. It too can be used in split low-voltage winding transformers. Arrangement (F) is for a series-multiple high-voltage winding transformer. This is for lower insulation levels only.

The sketches represent each leg of a 3-phase transformer, or one leg of a single-phase transformer. In a single-phase transformer, by using a two-legged core and different winding arrangements on each leg, a more flexible base is provided to meet special reactance requests.

Ban on Tax-Exempt Utilities To Get Arizona Airing

A constitutional amendment to remove the tax-exempt status of public power districts will be introduced into the Arizona Legislature, reports Rep. David H. Campbell of Maricopa County.

The proposition would be submitted to a vote of the public.

The amendment would lift from power districts their present designation as political subdivisions and make interest on bonds from such districts subject to taxation.

Campbell's proposal is directed primarily at the Salt River Power District operating in the central Arizona region around Phoenix.

A Comedy of Outlets

More Housepower to You, a comic book about adequate wiring, has been made available to utilities and other parts of the industry by NEMA's Wire & Cable Section. Designed as a mailing piece, it tells of the woes of one family with low Housepower, provides some basic wiring facts, and shows how a poor wiring job can be converted to a good one cheaply and easily. Price: $20 per thousand. Write M. Miller, NEMA, 155 E. 44th Street, New York 17, N. Y.

Craftsmanship at Allis-Chalmers

Welding Skills

and Facilities Assure Longer Service, Less Maintenance

Another example of combining manual skills with advanced engineering and modern equipment at Allis-Chalmers is found in the tank welding line. Special tank positioners permit operators to use the down-hand method in electric arc welding. This results in better welding accuracy and quality, guarantees strong, oil-tight welds. Closely controlled welding temperatures, weld sizes and fillets calculated and specified by engineers, add assurance of quality craftsmanship — help explain why Allis-Chalmers distribution transformers last longer with far less maintenance.

All Tanks Pressure Tested

Before getting a stamp of approval, all tanks are pressure tested after the welding operations. The welds are dusted with chalk. Oil-filled tanks are then pressurized. The smallest leak is easily detected by oil staining the chalk.

For all the details of Craftsmanship in Allis-Chalmers distribution transformers, call your A-C representative, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

ALLIS-CHALMERS

A-5558

The Meetings Calendar

FEBRUARY

• **North Central Electrical League**—Upper Midwest Electrical Industry Convention & Trade Exposition, Leamington Hotel and Municipal Auditorium, Minneapolis, Minn., Feb. 2-5.

• **National Rural Electric Cooperative Association**—Annual Meeting, Dallas, Texas, Feb. 2-6.

Edison Electric Institute — Prime Movers Committee, Penn-Sheraton Hotel, Pittsburgh, Pa., Feb. 3-5; Industrial Power & Heating Group, Netherland Hilton Hotel, Cincinnati, Ohio, Feb. 6-7; EEI-AGA 1958 Conference Final Planning Meetings, Ben Franklin Hotel, Philadelphia, Pa., Feb. 6-7; Electrical Equipment Committee, Dayton Biltmore Hotel, Dayton, Ohio, Feb. 10-11; Commercial Lighting Committee, New Orleans, La., Feb. 10-11; Transmission & Distribution Committee, Lord Baltimore Hotel, Baltimore, Md., Feb. 11-12; Residential Promotion Committee, New York City, Feb. 13-14; Electric Space Heating & Air Conditioning Committee, Birmingham, Ala., Feb. 13-14; Commercial Cooking & Water Heating Committee, Washington, D. C., Feb. 17-18; Meter & Service Committee, Sheraton Hotel, Philadelphia, Pa., Feb. 17-19.

Industrial Electrification Council — National Industrial Heating Conference, Netherland Hilton Hotel, Cincinnati, Ohio, Feb. 3-6.

• **National Warm Air Heating and Air Conditioning Association**—2nd Annual Short Course, Washington University Campus, St. Louis, Mo., Feb. 3-6.

American Institute of Electrical Engineers—Winter General Meeting, Statler and Sheraton-McAlpin Hotels, New York City, Feb. 3-7.

• **Electric Companies Public Information Program**—Workshop Conference Committee, Minneapolis, Minn., Feb. 6.

Missouri Valley Electric Association—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 6-7.

Pennsylvania Electric Association — System Operation Committee, Hotel Roosevelt, Pittsburgh, Pa., Feb. 6-7; Relay Committee Winter Meeting, Bellevue-Strafford Hotel, Philadelphia, Pa., Feb. 13-14; System Planning and Transmission & Distribution Committees joint meeting, Penn-Sheraton Hotel, Pittsburgh, Pa., Feb. 20-21; Electrical Equipment Committee Winter Meeting, Hotel Roosevelt, Pittsburgh, Pa., Feb. 27-28.

American Right of Way Association—Atlantic Coast Region Educational Seminar, Traymore Hotel, Atlantic City, N. J., Feb. 7-8.

NATIONAL ELECTRICAL WEEK WILL BE OBSERVED FEBRUARY 9-15.

American Public Power Association—Engineering & Workshop Meetings, Chattanooga, Tenn., Feb. 13-14.

National Society of Professional Engineers—Spring Meeting, Michigan State University, East Lansing, Mich., Feb. 13-15.

• **Puget Sound Electric League**—Pacific Northwest Electrical Industry Exposition, Civic Auditorium, Seattle, Wash., Feb. 14-16.

American Institute of Mining, Metallurgical and Petroleum Engineers—Annual Meeting, Hotel Statler, New York City, Feb. 16-20.

National Wiring Sales Conference — Statler Hotel, Detroit, Michigan, Feb. 20-21.

MARCH

Southern Safety Conference, Inc—Exposition, Peabody Hotel, Memphis, Tenn., March 2-4.

• **Electric Companies Public Information Program** — Inter-Regional Committee, Blackstone Hotel, Chicago, Ill., March 5; Steering Committee, Biltmore Hotel, New York City, March 12.

Right of Way Meeting — Electrical World's second conference on R/W practices, procedures, and problems, Conrad Hilton Hotel, Chicago, Ill., March 6-7.

Pacific Coast Electrical Association — Business Development Section, Statler Hotel, Los Angeles, Calif., March 6-7; Engineering & Operations Section, Sheraton Palace, San Francisco, Calif., March 27-28.

Lighting Lamps and Electrical Manufacturers Salesmen's Association—First National Lighting Exposition, Coliseum, New York City, March 9-12.

• **Public Utilities Advertising Association**—Regional Meeting, Montreal, Canada, March 13-14.

Nuclear Congress—Co-sponsored by American Society of Mechanical Engineers and the Engineers Joint Council, International Amphitheater, Chicago, Ill., March 16-22.

Interstate Power Club — Hotel Martinique, New York City, March 17.

National Association of Corrosion Engineers—Annual Conference & Exhibition, Municipal Auditorium, San Francisco, Calif., March 17-21.

• **American Institute of Electrical Enginers—and American Society of Mechanical Engineers**—Joint Management Conference Committee, Hotel Somerset, Boston, Mass., March 19-20.

Edison Electric Institute — Industrial Relations Committee, Headquarters, New York City, March 20; Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., March 24-27.

Institute of Radio Engineers—National Convention, Waldorf-Astoria Hotel and New York Coliseum, New York City, March 24-27.

Northwest Public Power Association — Engineering and Operations Section, Clark County PUD Electric Center, Vancouver, Wash., March 26-27.

American Power Conference—20th Anniversary Meeting, Sherman Hotel, Chicago, Ill., March 26-28.

• **Oklahoma Utilities Association**—Annual Convention, Oklahoma Biltmore Hotel, Oklahoma City, Okla., March 27-28.

Electrical Maintenance Engineers Association of Southern California—Industrial Electric Show and Conference, Shrine Convention Hall, Los Angeles, Calif., March 27-29.

Southeastern Electric Exchange—Annual Meeting, Boca Raton Hotel and Club, Boca Raton, Fla., March 31-April 2.

• Additions this week.

MORE BIG DATES FOR '58

American Public Power Association—Annual Meeting, New Orleans, May 6-8.

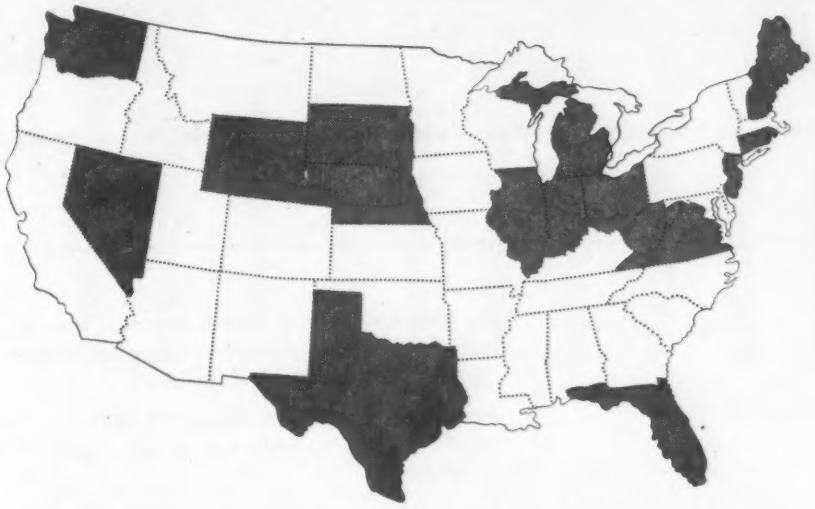
National Association of Purchasing Agents — Annual Convention, Chicago, May 11-14.

Edison Electric Institute—26th Annual Convention, Boston, June 9-12.

American Institute of Electrical Engineers — Summer General Meeting, Buffalo, June 22-27.

National Electrical Manufacturers Association—Annual Meeting, Atlantic City, Nov. 10-14.

The Management Newsletter



These states* levy no corporate tax on utilities, but . . .

State Taxes Are Biting Deeper

State and local taxes are on the rise. The expanded responsibilities of state, city, and county governments have pushed up their expenses. Increased emphasis on state educational and highway construction programs is destined to push them up still further in the future.

Revenues have not risen as fast as expenses, and the state and local governments are looking around for new sources of money. Their search is likely to mean that in the next decade a higher percentage of electric utility companies' operating revenue will find its way into state, city, and county treasuries.

The state corporate income tax is one source of revenue now being examined by several states. It is an especially tempting source to those states which do not now collect such a tax. With no rise in the federal corporate tax likely this year, this examination of the corporate income tax by the states seems to pose the most serious current tax-threat to utility companies.

States which levy no corporate income tax affecting private electric companies are shown in black on the map above. Three of the states, Connecticut, Rhode Island, and Virginia, exempt investor-owned electric utility companies from their corporate income tax (substituting another tax). South Dakota collects income tax from banks only. The other 14 states have no corporate income tax at all.

These states with no corporate income tax at all are dwindling. Up until a few weeks ago, Delaware would also have qualified for the list. But as of the first of

(*more*)

*The fourteen states that collect no corporate income tax at all are: Florida, Illinois, Indiana, Maine, Michigan, Nebraska, Nevada, New Hampshire, New Jersey, Ohio, Texas, Washington, West Virginia, and Wyoming. Investor-owned utilities in these states are taxed by other means, such as sales, use, and gross receipts taxes or franchise taxes.

These states have hiked their corporate income tax rate since 1950:

Colorado	Idaho	Maryland	Montana	South Carolina
Delaware (introduced new tax)	Kansas	Minnesota	Oregon	Utah
	Kentucky	Mississippi	Pennsylvania	Vermont

And this single state has reduced its rate over the same period:

Georgia

the year, Delaware collects a corporate tax—at a rate of 5%. And there are rumblings of new corporate income taxes under consideration in other states that have never levied them before.

New Jersey's state Tax Policy Commission is soon expected to recommend a 2½% to 3% net income tax on corporations, partnerships, and unincorporated businesses.

In **Michigan** a new corporate income tax is being considered.

Texas labor leaders are interested in replacing the current selective sales tax on automobiles, gasoline, cigarettes, and beer with a graduated corporate income tax.

And **New Hampshire,** whose utility franchise tax (on transportation and communication facilities as well as gas and electric companies) was recently declared unconstitutional, is expected to replace it with a corporate income tax.

Rates of state corporate income taxes are rising too. Thirteen states (listed above) have hiked their corporate income tax rates as they apply to electric utility companies since 1950, and only one state has lowered its rate.

But taxes on corporate income are not the only state taxes that affect electric utility companies and their customers. In many states, sales, use, and gross receipts taxes also take a heavy bite.

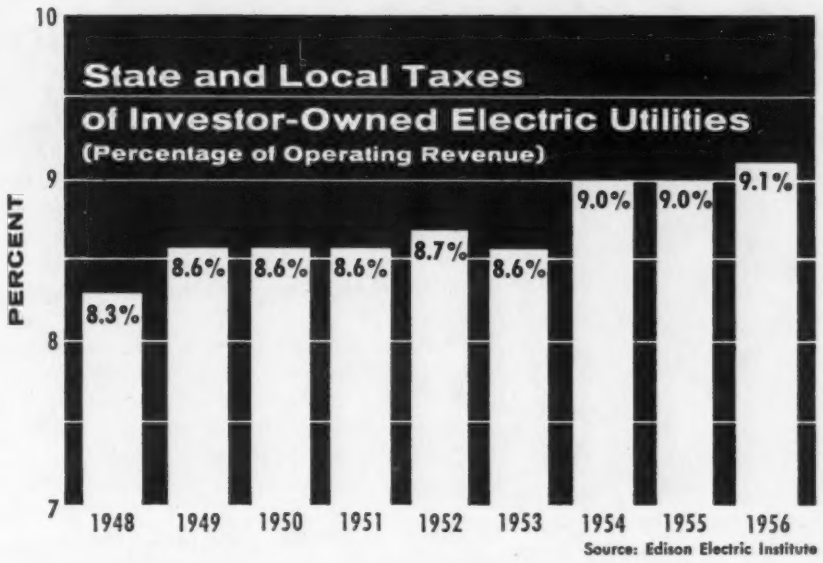
In **Connecticut** and **Virginia** the tax on gross earnings is levied on electric power companies in lieu of a corporate income tax. And in many other states it comes in addition to a corporate income tax, franchise tax, or both.

About 20 states put a tax on sales of electric energy. West Virginia levies a 5.2% general sales tax on electric companies' gross income derived from residential and commercial sales, and a 3.9% tax on industrial sales revenue.

In addition, several states have special taxes on electric energy. Alabama gets 2/5 of a mill per kwhr of hydro power generated and sold. South Carolina gets ½ mill per kwhr. Louisiana, Idaho, and Vermont have similar arrangements.

Mississippi levies a tax based on the number of miles of pole line in the state—at $22.50 per mile.

Local taxes also take a large cut from the revenues of many electric companies. Consolidated Edison Co of New York listed over $68 million in local taxes in 1956—a figure which gives the company the distinction of being the largest taxpayer in New York City. Con Ed provides about 6½% of all property taxes collected by the city government. And Con Ed's combined state and local taxes amounted to more than $82 million—just about double its federal tax bill.



The uptrend in state and local taxes paid by electric utility companies since 1948 shows up in the bar chart. In 1956 (the latest year for which actual data is available) state and local taxes accounted for 9.1% of operating revenue of all investor-owned electric utility companies—$685 million in all. This marks the highest dollar figure ever, and the biggest percentage bite since prior to World War II, when many functions now paid for by the federal government were handled by the states.

Projection of the trend indicates that state and local governments will collect $750 million from investor-owned electric companies for 1957 (9.3% of operating revenue), and $825 million (9.6%) for tax year 1958.

A strong hint that the trend will keep on rising is contained in a study of state and local government finances in 1965 prepared by the Tax Foundation, Inc. Allowing for increased federal aid to the states, the foundation projects a combined deficit for all the state governments running between $700 million and $1.3 billion in 1956. Projection of the local governments' deficit strikes between $3.6 billion and $4.8 billion.

The Tax Foundation points out that these figures are projections, not predictions. But the study concludes with the statement that "extremely difficult tax problems are virtually assured for state and local governments" through 1965.

The effect of this trend on electric utilities and their customers is clear. Along with the higher costs of labor and equipment, higher state and local taxes will exert one more pressure tending to force kwhr rates upward.

Expenditures of the state and local governments have been rising steadily

(per capita expenditures)

	1902	1948	1950	1952	1954	1956
State.....	$ 2.32	$66.23	$85.62	$87.50	$100.36	$122.36
Local.....	$11.72	$69.43	$85.84	$97.45	$112.94	$131.46

SEE's Smith Asks 'Business in Public Interest'

L. M. SMITH

The business of the business man is more than making money, Southeastern Electric Exchange Pres L. M. Smith wrote recently. Said Smith's text: ". . . These are some of our goals as we work in the public interest: (1) To see that our company is a good place to work; (2) That it is a 'good citizen' of the community; (3) That it is a good outfit to do business with; (4) That it is a safe place to invest money; (5) That it is squarely behind our American system of individual freedom and opportunity."

But Smith did not play down the matter of profits. With the profit motive under scrutiny and attack from various segments in our society, the Alabama Power Co exec says it's important to remember that only a profitable business will attract investors; that only a profitable business can continue to serve the public adequately, to pay its just share of taxes for schools and defense, to employ workers and offer them good jobs and opportunity for advancement.

Are we as an industry doing enough to explain our interests and accomplishments? No, Smith says. He called for that "day-to-day, hour-by-hour job of cultivating continuous good will" that will build the long-range friendships so vital to a company's welfare.

Smith's summary: "You and I cannot afford to live apart in this atomic and electronic age, governed solely by our technical competence in specialized fields—such as engineering, accounting, finance and sales. We cannot as men of business shirk our community responsibilities without continuing to be misunderstood, criticized, and suspected. We cannot afford to pass up any opportunity for making friends and for building greater confidence not only in the investor-owned electric utility, but in the whole business structure that has done so much to make this nation great."

Central Hudson G & E Will Spend $100 Million

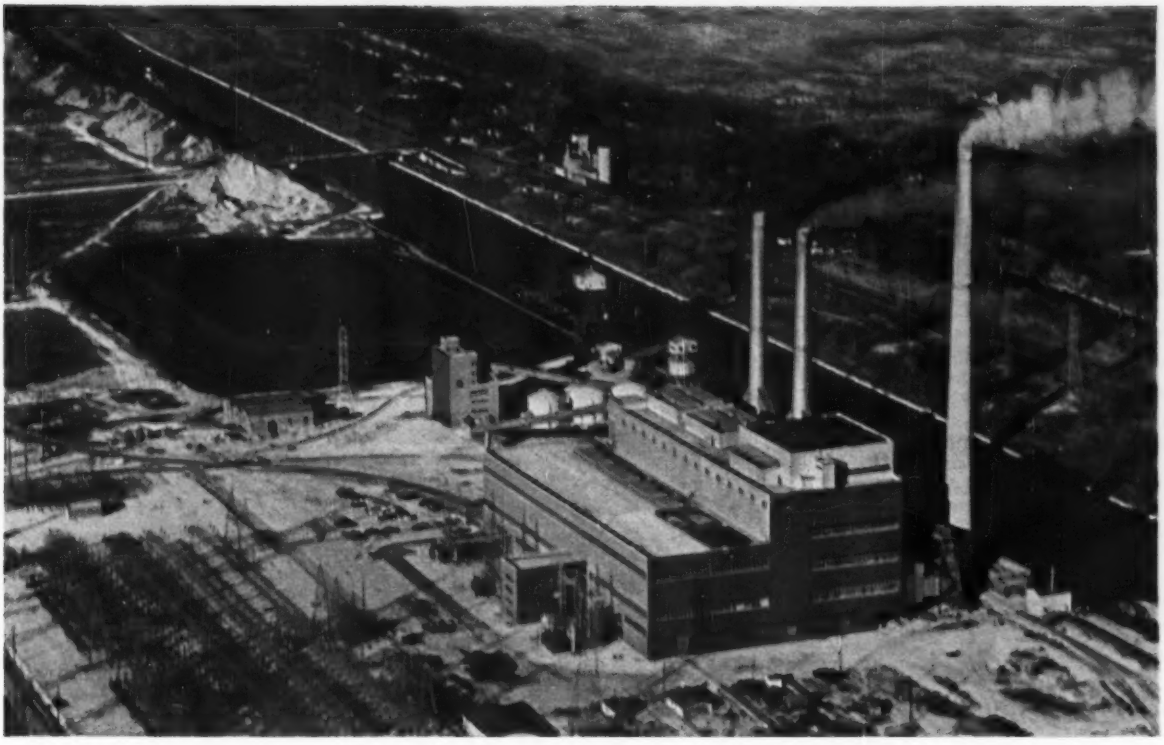
E. R. ACKER

Central Hudson Gas & Electric Corp expects an annual increase of 9% in kwhr sales for the next five years, company Pres Ernest R. Acker told the New York Society of Security Analysts recently. He based his forecast on CHG&E's growth rate from 1945 to 1956, and added that the company expects the number of its electric customers to increase by 3% per year.

A record $100 million is budgeted for construction expenditures in the next five years, 1958-62. This amount equals CHG&E's total construction outlay for the 16-year period from 1942 through 1957. About half of the $100 million is earmarked for new generating facilities at the company's Danskammer Point Steam Station. In forecasting requirements, the Future Planning Committee used a 4½%-per-year compounded increase in unit cost of construction.

Construction spending in '58 will hit a record $21.9 million, about $6 million ahead of '57. Danskammer Point alone will take more than $13 million.

Where will '58 construction funds come from? Appoximately $4.8 million will come from internal sources—including depreciation accruals, normalized tax credits, and retained earnings. The balance of $17.1 million will come from outside sources, probably commercial bank loans and a mid-year bond issue.

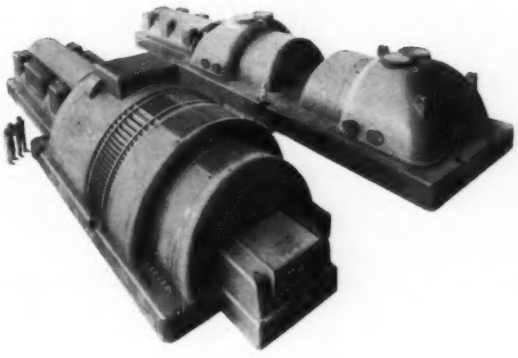


Setting new records with world's largest generating unit

As one step in an expansion program totalling two million kw, Chicago's Commonwealth Edison Co. in 1957 placed in operation the largest turbine generator in the world at their Will County Station. This 275,000 kw unit burns 125 tons of coal an hour and uses 204,000 gallons of circulating water every minute.

The project was designed by Stone & Webster Engineering Corporation and constructed by Commonwealth Edison. The close cooperation between designer and builder permitted this unit to be installed in the unusually short period of 28 months.

As a completely integrated organization, Stone & Webster Engineering Corporation is experienced and equipped to handle a single engineering phase or to take full responsibility for the completion of your entire project.

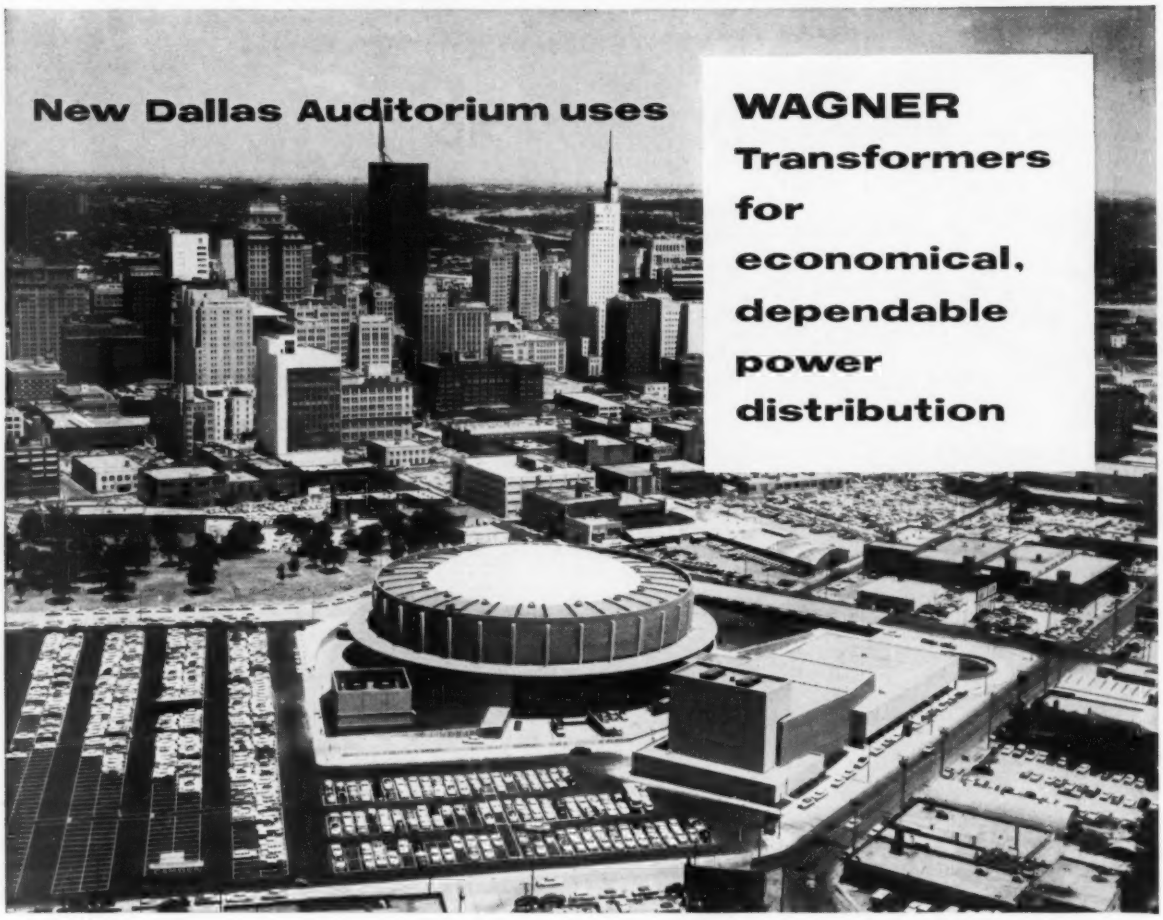


New Cross-Compound Unit has LP turbines with 43-in. last stage blades.

Write or call us for information as to how our experience may be of assistance to you.

STONE & WEBSTER ENGINEERING CORPORATION
A SUBSIDIARY *of* STONE & WEBSTER, INC.

New York Boston Chicago Pittsburgh Houston San Francisco Los Angeles Seattle Toronto



The mammoth, saucer shaped Dallas Memorial Auditorium, with its 300 foot diameter circular stadium, is a tremendous consumer of electric power. Its total connected load for power and lighting is 3250 kva. That's enough electricity to supply the power needs of 1200 modern homes!

This electric power is distributed efficiently and economically by 21 Wagner Dry Type Transformers. These transformers put the correct voltage right where it is needed—close to the load. Such installations are extremely economical because they eliminate long runs of wiring and reduce line losses in the distribution system. They meet all safety requirements for indoor installation.

Wagner Dry-Type Transformers can answer your power distribution needs just as they do at the Dallas Auditorium. Call your nearby Wagner Sales Engineer and have him tell you how these transformers can modernize your power distribution system. Bulletin TU-57 gives full information if you prefer to write.

A 300 kva Wagner Dry-Type Transformer in the Dallas Auditorium . . . one of 21 of these units, ranging from 25 through 300 kva, that provide a total capacity of some 2400 kva.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

. . . to help America LIVE BETTER—*Electrically*

LIVE BETTER ELECTRICALLY

Wagner Electric Corporation
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

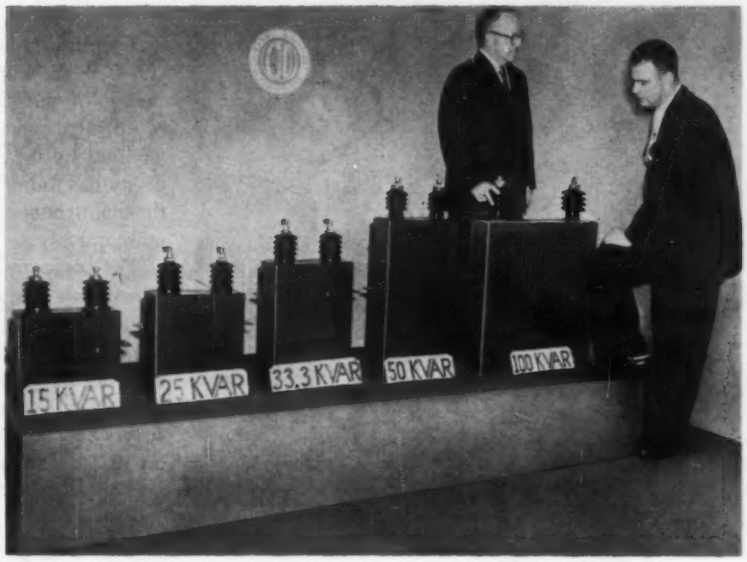
WT58-7

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

C-D Introduces 100-Kvar Capacitor

Cornell-Dubilier Electric Corp has arrived at another milestone in the power capacitor industry with the introduction of the first individual capacitor units rated to deliver 100 kvar.

This largest unit is shown in the series of sizes produced by the company. Its advantages are being discussed by L. S. Billman (left), chief engineer, and R. H. Arany, sales manager, both of C-D's Power Factor Division.



This new concept in capacitors is in limited production at the company's South Plainfield, N. J., plant. The "100" will be available in standard voltage ratings of 4800, 6640, 7200, 7620 and 7960 v. Each unit produced will be full-voltage energization tested as a quality control measure before being passed for shipment.

The 100-kvar capacitors will have lower delivered costs per kvar (less than half of the 15-kvar 1939 value of $7), savings in space required for substation racks, and more compact pole-mounted banks.

Other "firsts" in the capacitor industry reported by the company are the introduction of the contour (circular) pole-mounting rack and of units rated in excess of 25 kvar—the 33.3 kvar capacitors announced in early 1955.

Insuldur Highlights Westinghouse Transformer Developments

• Insuldur is a new insulation system for distribution transformers. This system, consisting basically of adding a stabilizing compound to the paper insulation between wire layers, is expected to increase considerably the permissible operating temperatures of future transformers.

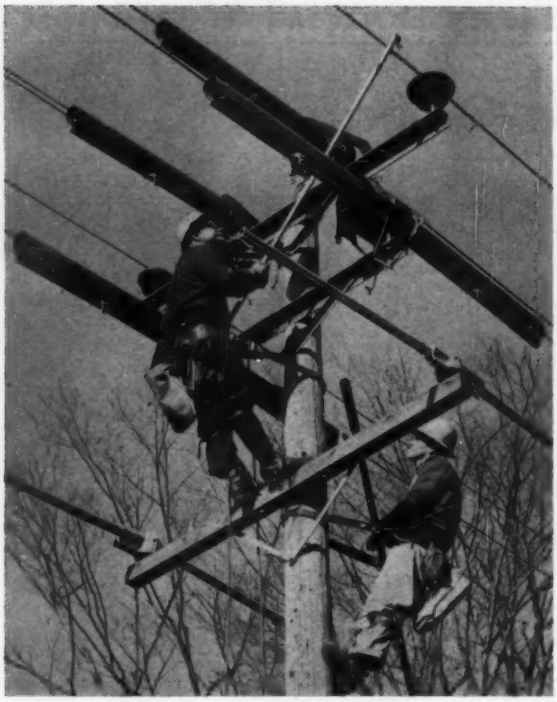
The new insulation was described by Dr. Jack Swiss, manager of Westinghouse Research Laboratories' insulation department, as containing "an organic compound capable of retarding the thermal decomposition of insulating papers and cloth when these materials are subjected to normal operating and overload temperatures. Besides counteracting the destructive effect of temperature, the organic compound reacts chemically with the cellulose fibers and makes the paper stronger and longer lasting." He continued, "By combining these effects, we believe this new insulation will raise substantially the 'life expectancy' of distribution transformers." Insulation life is indicated to be increased as much as three times at higher temperatures.

• Pole-type distribution transformers with cover bushings are now available with plastic-coated covers and cover hardware. The plastic coating on the main and hand-hold covers and on the eye bolt and handhole bolt provides adequate insulation protection against line-lockout from birds and squirrels. Transformers with plastic coated covers will be easily identified in the field by the lighter colored cover and hardware.

• A 380-mva, 17.2-69-kv transformer, weighing 554,000 lb when installed, has been shipped to the Commonwealth Edison Co's Fisk generating station. "This unit provides greater capacity in less space than any other ever built," says J. H. Chiles, vice president in charge of Westinghouse's transformer division." It is also lighter, lower and narrower than similar units having only 80% as much capacity," he said.

• The production of transformers with ratings of 600 mva and more in the near future has been predicted by Chiles. This can be done by utilizing the division's specially designed, three-part railroad car (EW, March 25, 1957, p 132) which permits shipment of transformers even larger than that mentioned.

(*More M&M on page* 114)



Formica Hoods Save Time for Connecticut Power

The Housatonic Division of the Connecticut Power Co, Canaan, Conn., has come up with substantial time saving in power-line maintenance. Through the use of Formica conductor covers and insulator hoods, manfactured by the A. B. Chance Co, Centralia, Mo., the utility has found the protection on the conductors gives the maintenance men more security, and they do the job more quickly.

The company's operating superintendent reports the 48-in. long Formica insulators are "quickly installed, lighter in weight, more compact and less complicated to install than the old methods we have used in connection with hot-line tools in the past." The maintenance men use 8-ft hot-line poles to install the light-weight Formica covers and hoods. Applications have been on 36 miles of 13.2-kv subtransmission line and 280 distribution miles of 4.8-kv pole line.

PD's 230-Kv Cable System Installed at Huntley Station

A 230-kv low-pressure, oil-filled, cable system has been installed at the C. R. Huntley Station of Niagara Mohawk Power Corp. It will serve a 200-Mw generating unit recently installed and a similar unit which will go into full operation sometime this year. The cables were manufactured by Phelps Dodge Copper Products Corp.

Three cables with concentric copper conductors of 1,250 Mcm serve the unit now in operation. The second unit will also be served by three cables of the same construction. A spare cable is in place to be used by either unit. All lengths are continuous without splices and connect the generating units to the main switchyard, a distance of 1,500 feet.

The cable installation includes three unusual features: "Direct burial," a new installation method for this type and voltage; a jacket of polyethylene over the cable's lead sheath as a maximum protection against corrosion; and a separate cooling system consisting of continuous loops of polyethylene flexible pipe installed above the cables. Water can be circulated through the pipe if the temperature detectors buried with the cables indicate a dangerous condition.

Remington Has Reader for Microfilmed Drawings

A microfilm reader-enlarger-processor, the REP II, has been developed by Remington Rand Div, Sperry Rand Corp, New York, for on-the-spot reproduction of microfilmed engineering drawings.

This self-contained, semi-automatic unit is priced at almost $5000. It consists of a projection system, enlarging easel, and single-sheet processor. Enlargements up to 17 x 22 in. are made from tabulating aperture cards holding 16-mm or 35-mm films. It can use standard-weight photographic enlarging paper, or translucent intermediate paper for further reproduction on spirit, diazo, or blue-print machines.

If prints are desired, the viewing table is swung out. A conveyor brings photographic paper under the projector. Prints can be delivered in 50 sec.

New Marketing Approach For GE Transformers

A new approach has been applied to a basic marketing principle by General Electric Co in its new line of power transformers—the Preferred Design transformers introduced last year (EW, May 27, 1957, p 134, and Nov. 18, 1957, p 122).

The principle: Show the customer how he is getting a tailor-made product, but standardize the basic "out of sight" components for efficient manufacture and economical scale. The approach: Externally—accessories and "trimmings" are offered in a limited range; internally—transformers are extremely flexible in electrical characteristics, capacity, impedance, losses, etc. Thus, Preferred Design transformers have a similar appearance, but inside they are tailored to customer requirements.

Immediate benefits to users are shorter delivery time and early knowledge of dimensions. Long term benefits are resistance to rising costs, conservation of technical manpower, and an easy approach to standardization to take advantage of benefits that are possible now.

Calectric Promotes Johnson

Willis T. Johnson, vice president and executive engineer of California Electric Power Co, has been elevated to the position of vice president and assistant general manager of the company.

In his new capacity he fills the vacancy created in July when Fred Oldendorf was appointed vice president and general manager.

Johnson, who joined Calectric in 1925 as senior student, has gained wide experience in the electrical engineering field during his 32 years with the utility. During this time he has supervised the design of three steam power plants and construction of two.

His experience also includes positions as local, general, and district superintendent; district manager at Imperial Valley; assistant to the general superintendent at Riverside; assistant general superintendent and later general superintendent; and assistant executive engineer. He became executive engineer in 1950 and was named to his latest post in 1951.

Texas Utility Names New Department Head, PA

HOLLIS DUNCAN OSCAR GARNER

Hollis Duncan, former purchasing agent of Southwestern Electric Service Co, has been named to head the newly created system operating department.

As superintendent of system operations, he will be responsible for the operation, maintenance, and construction of transmission and distribution lines. The responsibilities of the department will also include engineering and purchasing activities of the company.

Duncan is succeeded as purchasing agent by Oscar Garner.

In other promotions, George Burrill was named system engineer and Gayland Wilson was promoted to manager at Groesbeck (Tex.) to succeed Roland Gardner, who has retired.

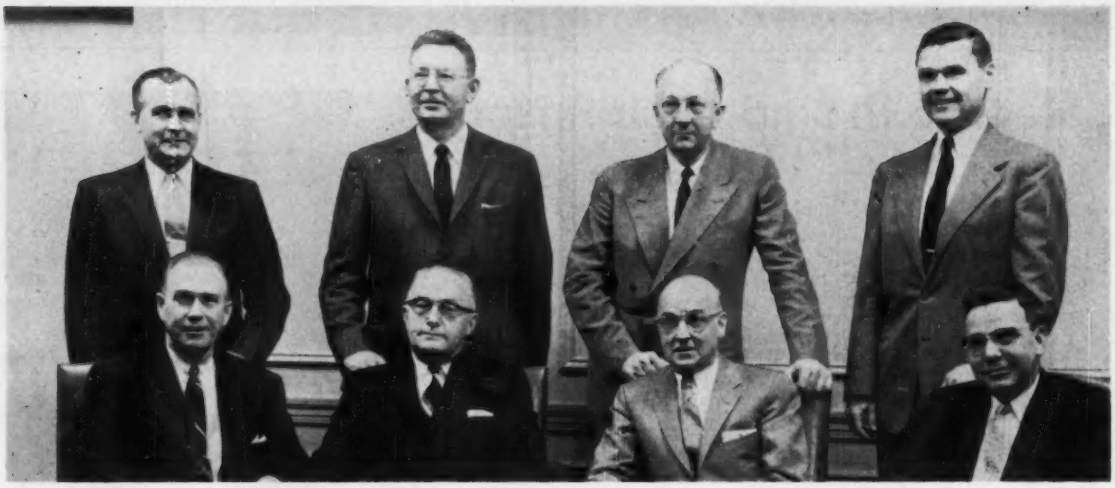
Ridge and Hartmann Become VP's at Roebling

Recently elected as vice presidents of John A. Roebling's Sons Corp were William C. Ridge and E. George Hartmann.

Ridge, who has been placed in charge of production, comes to his new position from that of works manager of the corporation. A 15-year veteran with Roebling, he previously served as manufacturing manager of its Electrical Wire Division and as manager of the Standards Engineering Division.

Hartmann, who was named sales vice president, will be located at the main office in Trenton, N. J. His previous experience with the company includes service as general product manager of the Wire and Cold Rolled Products Division.

W. C. RIDGE E. G. HARTMANN



Sylvania Ups Eight in Decentralization Action

Heading the list of eight executive promotions at Sylvania Electric Products, Inc, were the recent elections of Frank J. Healy as senior vice president and president of Sylvania Lighting Products Division and of Matthew D. Burns as senior vice president and president of the electronic tubes component of the company.

The newly created position of senior vice president also went to Dr Bennett S. Ellefson, who assumes responsibility for engineering and research; Marion E. Pettegrew, home electronics, chemical and metallurgical products, and parts; W. Benton Harrison, finance; Howard L. Richardson, electronic systems and special tubes; Robert E. Lewis, semiconductor products and Argus cameras; and Barton K. Wickstrum, who was placed in charge of marketing and international operations.

The new officers are, bottom, left to right, Lewis, Healy, Burns, and Wickstrum; and top, Ellefson, Pettegrew, Harrison, and Richardson.

The creation of these new position reflects increased emphasis by the company on its policy of decentralization of managerial authority and accountability, said Pres Don G. Mitchell in making the announcement.

D. C. HORMELL C. R. BARTHELEMY L. M. DAVIS E. V. CULLEN J. J. CUNIFFE

Pioneer Advances Five Officers to New Duties

In a series of top management promotions, Pioneer Service & Engineering Co has appointed D. C. Hormell as vice president and consulting engineer; Carl R. Barthelemy as vice president and chief engineer; and L. M. Davis as vice president and chief structural engineer.

In addition, E. V. Cullen, now vice president and chief purchasing engineer, assumes promotional and special assignments and is succeeded as chief purchasing engineer by J. J. Cuniffe.

Others receiving simultaneous appointments were W. F. Bergman, who becomes chief electrical engineer for the company; H. L. Hoeppner, who was named consulting electrical engineer; L. J. Booth, who advances to chief mechanical engineer; Wilbur Barrows, who succeeds retiring Stephen Wehner as chief hydraulic engineer; Donald J. Callen, who rises to manager of the Rate Division; and Winson Martin, who becomes rate consultant.

Fargo Mfg Co Elevates Wengen and Wheaton

Fargo Manufacturing Co, Inc, has announced the recent promotions of Henry R. Wengen to the position of vice president of engineering development and Scott R. Wheaton to sales manager of the company.

Wengen comes to his new post after serving as sales manager and vice president-sales since 1946, when he joined the Poughkeepsie (N.Y.) firm. Wengen, who holds a bachelors and masters degree from Massachusetts Institute of Technology, began his career in the utility field in 1929, when he joined Central Hudson Gas & Electric Corp.

Wheaton most recently served as assistant sales manager. He joined Fargo upon graduating from Duke University in 1951, and has since served in a number of positions of increasing responsibility.

S. R. WHEATON H. R. WENGEN

PERSONAL BRIEFS

Wells P. Allen, Jr, has been appointed chief power supply engineer of New York State Electric & Gas Corp . . . New chief electrical inspector of Tacoma (Wash.) City Light is **Bert N. Hardy.**

The generation dept of Pennsylvania Power & Light Co has advanced **Ralph L. Hallman** to assistant superintendent of generation; **Frederick W. Kuehn** to plant betterment engineer at Hazelton; **William H. Kopenhaver** to superintendent, Sunbury plant; **Thomas B. Richards,** to assistant general superintendent; **James S. McKelvey** to superintendent, Martins Creek plant; **Donald D. Schulz** to assistant superintendent, Martins Creek; and **Robert L. Daniels,** superintendent, Suburban plant.

At Toledo Edison Co, **Morrison L. Conner** has been named associate engineer in electrical engineering; **Archie L. King;** associate engineer, meter dept; **Kenneth E. Brancheau,** overhead standards engineer; **Thomas S. Selmek,** senior assistant engineer, system operations dept; **Donald C. Keller,** electrical engineering dept, Toledo; and **Robert V. Bins,** senior assistant engineer, power production dept.

Roland R. Blantz is moved up to the new post of training and safety manager at Portland General Electric Co.

Montana Power Co recently elected **Jerry J. Harrington** treasurer to succeed **Harry C. Donaldson,** retired. **Edwin H. Duffy** was made assistant secretary and assistant treasurer and **Theodore Cann** became auditor.

Texas Atomic Energy Research Foundation has appointed **Dr D. W. Kerst** as project leader of its thermonuclear research program . . . **Dr W. H. Jens** was recently made assistant technical director for Atomic Power Development Associates, Inc, Detroit.

Carl F. Wall has advanced to manager of Central Illinois Public Service Co's rates and research dept . . . New secretary and assistant treasurer of South Carolina Electric & Gas Co is **Eugene M. Simpson.**

Cyril Ainsworth is new deputy managing director American Standards Assn. He is succeeded as technical director by **J. W. McNair** . . . Electrical Equipment Representatives Assn has appointed **C. W. Sward** as executive director to replace the late **F. E. L. Whitesell.**

Donald W. Gunther is new manager of Westinghouse Electric Corp's semi-conductor dept and manufacturing plant at Youngwood, Pa . . . Westinghouse Supply Co recently named **Harry A. Hillman** assistant to the president.

General Electric Co has appointed **Dom P. Timo** manager of Large Steam Turbine-Generator Dept's electro-mechanical engineering unit, materials and processes laboratory . . . GE Communication Products Dept has named **Richard P. Gifford** manager of engineering to succeed **C. M. Heiden,** now with the research laboratory . . . **Dana A. Batchelder** is new manager-finance for GE's Gas Turbine Dept.

At Maryland Shipbuilding & Drydock Co, **Walter R. Gerich** has been appointed chief engineer and **Freeman W. Lohr** plant engineer . . . The Standards Council of American Standards Assn has as its new chairman **T. E. Veltfort.**

Erratum

Sylvester J. McKelvy was recently advanced to assistant to the industrial relations manager of Public Service Electric & Gas Co's electric department, not to industrial relations manager, as reported on page 118 of the January 13 issue of Electrical World.

OBITUARY

Fred Holmes, chairman of the board and former president of Duncan Electric Manufacturing Co, died January 15.

Russell G. Bellezza, 60, vice president of sales and traffic at General Cable Corp from 1950-1956, died recently after a short illness. At the time of his death he was with Dept of Health, Education, and Welfare.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

DISPLAYED RATE:

EMPLOYMENT OPPORTUNITIES: $22.67 per inch. Subject to Agency Commission.

EQUIPMENT & BUSINESS OPPORTUNITIES: $16.85 per inch for all advertising appearing on other than a contract basis. Not subject to Agency Commission.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style

UNDISPLAYED RATE:

$1.80 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

PROPOSALS, $1.80 a line an insertion.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

SEND NEW ADVERTISEMENTS TO Classified Advertising Div. of ELECTRICAL WORLD, P. O. Box 12, N. Y. 36, N. Y.

LARGE POWER EQUIPMENT

Prompt Stock Shipment

RENUBILT MOTORS - GENERATORS

TRANSFORMERS - CIRCUIT BREAKERS

DO YOU GET OUR STOCK LIST?

BELYEA COMPANY, INC.

51 Howell St. Jersey City, N. J.

OL 3-3334

WANTED

Civil or Electrical Engineer

Graduate, for utility sales promotion work involving distribution and transmission line wood poles. Some utility experience desirable. Furnish resume of qualifications and salary requirements to

P-7187, Electrical World

520 N. Michigan Ave., Chicago 11, Ill.

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.

NEW YORK: P. O. Box 12 (36)

CHICAGO: 520 N. Michigan Ave. (11)

SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

Operations Assistant—for diversified utility firm in Fairfield County, Connecticut. Must be engineering graduate with utility operating experience and some knowledge of utility accounting. Work directly under direction of Vice President on analysis of property operations. Submit complete resume and salary desired. P-7189, Electrical World.

EMPLOYMENT SERVICE

Salaried Personnel. $5,000-$30,000. This Confidential service established 1920, is geared to needs of high grade men who seek a change of connections under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, P. O. Box 674, Manchester, Vermont.

Advertising Agency Needs

ELECTRICAL ENGINEER

Who Can Write

Utility experience required; system planning preferred, to write advertising for apparatus and other products sold to utility companies and industry. The E. E. we hire will be direct assistant to the Account Executive for one of our most important advertising clients. He will work directly with executives in our advertising agency and engineers in the client's organization.

This is an extremely unusual opportunity for a man who would like to broaden his experience and build a position and a bright future for himself. Attractive air conditioned Michigan Avenue offices with one of the largest national advertising agencies.

Write or phone, in complete confidence. Give details on education, experience, writing ability, and present salary.

Address Mr. Waldo L. Gundlach, Erwin Wasey, Ruthrauff & Ryan, Inc, 360 N. Michigan Ave., Chicago 1 or phone FInancial 6-1833.

FOR RATES OR INFORMATION

About Classified Advertising

Contact The McGraw-Hill Office Nearest You.

ATLANTA, 3—1301 Rhodes-Haverty Bldg.
R. POWELL — *JAckson 3-6951*

BOSTON, 16—350 Park Square
J. WARTH — *HUbbard 2-7160*

CHICAGO, 11—520 No. Michigan Ave.
W. HIGGENS — *MOhawk 4-5800*

CINCINNATI, 37—2005 Seymour Ave.
F. ROBERTS — *ELmhurst 1-4150*

CLEVELAND, 13—1164 Illuminating Bldg.,
W. SULLIVAN — *SUperior 1-7000*

DALLAS, 2—1712 Commerce St., Vaughn Bldg.
G. MILLER — *RIverside 7-5117*

DETROIT, 26—856 Penobscot Bldg.
J. GRANT — *WOodward 2-1793*

LOS ANGELES, 17—1125 W. 6 St.
R. YOCOM — *MAdison 6-9351*

NEW YORK, 36—500 Fifth Ave.
OXford 5-5959
R. OBENOUR — D. COSTER — R. LAWLESS

PHILADELPHIA, 3—17th & Sansom St.
RIttenhouse 6-0670
H. BOZARTH — R. EDSALL

ST. LOUIS, 8—3615 Olive St.
F. HOLLAND — *JEfferson 5-4867*

SAN FRANCISCO, 4—68 Post St.
R. ALCORN — *DOuglas 2-4600*

PROFESSIONAL SERVICES

AMERICAN AIR SURVEYS, INC.

- Aerial Topographic Maps & Photos
- Plan & Profile for Transmission Lines
- Aerial Stereo-photos for Planning
- Topographic Maps for Reservoir Studies
- Coal Stockpile Volumes by Aerial Method

907 Penn Avenue — Pittsburgh 22, Pa.

BARKER & WHEELER

Utility and Industrial Valuations, Design and Construction of Power Systems, Water Supplies, Sewerage and Sewage Disposal, Factory Production and Cost Control Systems.

11 Park Place, New York City
36 State Street, Albany, N. Y.

BLACK & VEATCH
Consulting Engineers

Electricity—Water—Sewage—Industry
Reports, Design, Supervision of Construction
Investigations, Valuations and Rates

1500 Meadow Lake Parkway — Kansas City 14, Mo.

UTILITIES ERECTORS & CONSULTANTS

Power Plant equipment erection, mechanical and electrical construction from manufacturers and engineers drawings. Supervision by general power engineering staff for heat cycle coordination. Improvements—Modifications—etc.

Brooklyn Engineering Corp. — Baltimore 26, Md.

THEODORE D. BROSS LINE CONSTRUCTION CORP.

Steel Tower & Wood Transmission Lines
Distribution & Maintenance

175 Enfield St. — Hartford, Conn.

BURNS and ROE, Inc.

Engineering and Design • Reports • Surveys
Construction • Electric, Steam, Hydro Plants
Transmission • Distribution • Aeronautical Facilities • Research and Development • Nuclear, Chemical, and Industrial Plants

160 West Broadway • New York 13, N. Y.

COMMONWEALTH SERVICES INC.

Management and Business Consultants
300 Park Ave
New York 22, N. Y.

ASSOCIATES INC.

Consulting and Design Engineers
209 E. Washington
Jackson, Michigan

DAY & ZIMMERMANN, INC.
Engineers

Design—Construction
Transmission—Distribution Lines
Reports—Valuations—Rates

New York — PHILADELPHIA — Chicago

DOBLE ENGINEERING COMPANY
Electrical Insulation Engineers

Field Testing and Maintenance of High Tension Insulation, Special Problems in Electrical Communications

Office and Laboratory: Doble Park
Box 344, Belmont 78, Mass. (6 miles from Boston)
Branch Office: 20 N. Wacker Dr., Chicago, Ill.

ELECTRICAL TESTING LABORATORIES, INC.

2 East End Ave. — New York 21, N. Y.

Electrical, Electronic, Environmental, Photometric and Chemical Laboratories. Testing, Research, Inspection and Certification.

FORD, BACON & DAVIS
Engineers

DESIGN • CONSTRUCTION
VALUATIONS • REPORTS

New York • Chicago • Los Angeles

GILBERT ASSOCIATES, INC.
Engineers and Consultants

DESIGN
SUPERVISION OF CONSTRUCTION
BUSINESS AND ECONOMIC RESEARCH

Reading, Pa. — New York, N. Y.

HARZA ENGINEERING CO.
Consulting Engineers

Calvin V. Davis — E. Montford Fucik
Richard D. Harza
Hydroelectric Plants and Dams
Transmission Lines
Flood Control, Irrigation
River Basin Development

400 West Madison Street — Chicago 6

HOOSIER ENGINEERING COMPANY

Erection and Maintenance of Electrical Transmission and Distribution Lines

1359 Holly Ave., Columbus 16, Ohio

JACKSON & MORELAND, INC.
Engineers and Consultants

Design and Supervision of Construction
Reports—Examinations—Appraisals
Machine Design—Technical Publications

Boston — New York

JENSEN, BOWEN & FARRELL
Engineers

Appraisals—Investigations—Depreciation Studies—Cost Trends—Reports
for Rate Cases, Security Issues, Regulatory and Accounting Requirements
Original Cost and Continuing Property Record Determination
Ann Arbor, Michigan

M. W. KELLOGG
Piping System Design Analyses

Unique model tester as well as modern digital computer facilities available for low cost, accurate flexibility analyses of the most complex piping systems.

The M. W. Kellogg Company
711 Third Ave., New York 17, N. Y.

THE KULJIAN CORPORATION
Engineers - Constructors - Consultants

POWER PLANT SPECIALISTS
(Steam, Hydro, Diesel)
Utility • Industrial • Chemical

1200 N. Broad St., — Philadelphia 21, Pa.

PETER F. LOFTUS CORPORATION
Design and Consulting Engineers

Electrical • Mechanical • Structural
Civil • Nuclear • Architectural

First National Bank Building
Pittsburgh 22, Pennsylvania

CHAS. T. MAIN, INC.
Engineers

Electric, Steam and Hydraulic Projects,
Investigations, Reports, Appraisals
Designs and Construction Supervision

80 Federal St., Boston 10, Mass.

PIONEER SERVICE & ENGINEERING CO.

Consulting and Design Engineers . . Purchasing
Specialists in Financing
Accounting and other Operations

231 So. La Salle St. — Chicago 4

SANDERSON & PORTER ENGINEERS

Design
Construction

New York — New York

SARGENT & LUNDY
Engineers

140 South Dearborn St.

Chicago, Ill.

SVERDRUP & PARCEL, INC.
Engineers - Architects

Design, Construction Supervision
Steam and Hydro Power Plants
Power Systems - Industrial Plants
Studies - Reports

St. Louis — San Francisco — Washington

TIPPETT & GEE
Consulting Engineers

Mechanical • Electrical • Thermodynamic
Structural Design • Studies • Supervision
Power Stations • Transmission • Distribution
Industrial Plants • Process

1333 North Second Street — Abilene, Texas

TREE PRESERVATION CO. Inc.,

Transmission R/W Clearing
Chemical Brush Control
Utility Tree Trimming
Seeding

Elmsford — New York
Tel: LY 2-7800 - 2-7801 - 2-7802

F. A. TUCKER, INC.
Contractors—Engineers

specialize in
Distribution - Transmission - Telephone lines - Maintenance - Roads - Bridges Dams

Main Office — 28½ Center Street, Rutland, Vt.
Branch Office — Little Rock Road, Charlotte, N. C.

UTILITIES LINE CONSTRUCTION COMPANY, INC.
Construction and Maintenance

Transmission - Distribution
Electric and Telephone Lines
Consultants

505 York Road — Jenkintown, Pa.

THE J. G. WHITE ENGINEERING CORPORATION

Design • Construction • Reports • Appraisals

80 Broad Street, New York 4

Advertising Index

Allis-Chalmers Mfg. Co.....8, 9, 105
American Chain & Cable Co., Inc., Page Fence Ass'n..... 98
Anderson Electric Corp.....10, 11

Baldwin-Lima-Hamilton Corp., Eddystone Div. 30
Bechtel Corp. 87
Bell Telephone Laboratories..... 27
Bethlehem Steel Co..... 43
Blackburn Corp., Jasper..... 97

Combustion Engineering, Inc..... 44
Continental-Diamond Fibre, Sub. Budd Company, Inc. 42

Delta-Star Electric Division, H. K. Porter Company, Inc..... 79
Directory of Engineers..... 119
Dowell Incorporated 38

Eddystone Div., Baldwin-Lima-Hamilton Corp. 30
Electro-Motive Div., General Motors Corp. 52, 53
Elliott Company 28, 29
Engineers, Directory of..... 119
Erico Products, Inc..... 78
Everstick Anchor Co..... 86
Exide Industrial Div., The Electric Storage Battery Co.....3rd Cover

G&W Electric Specialty Co..... 83
General Electric Co. Apparatus Dept. 76, 77, 80
Globe Company, The..... 82
Goodrich Chemical Co., B. F..... 32
Gulf Oil Corp.....16, 17

I-T-E Circuit Breaker Co., Small Air Circuit Breaker Div..12, 13
Indiana Steel & Wire Co., Inc..... 102
International Harvester Co.....40, 41

KPF Electric Co..... 85
Kaiser Engineers Div., Henry J. Kaiser Co. 91
Kerite Company, The..... 54
Kuhlman Electric Co.....4th Cover

Lapp Insulator Co., Inc.....6, 7
Line Material Industries.....33, 34, 35, 36, 37

Mineralac Electric Co..... 102
Minneapolis-Honeywell Regulator Co. Industrial Products Group.....100, 101
Moloney Electric Co.....14, 15

Natvar Corp. 103

Ohio Brass Co.....23, 24, 25, 26
Okonite Company 4
Onan & Sons Inc., D. W..... 102

Page Fence Ass'n., American Chain & Cable Co., Inc..... 98
Painut Company 104
Pennsylvania Transformer Div., McGraw-Edison Co. 46, 47
Pfaff & Kendall..... 96

RT&E Corp. 93
Reynolds Metals Co.....50, 51
Roebling's Sons Corp., John A..... 81

S&C Electric Co..... 18
Sangamo Electric Co..... 31
Searchlight Section 118
Superior Switchboard & Devices Co.. 98
Stone & Webster Engineering Corp.. 111

Texas Company, The.....2nd Cover
Thomas & Betts Co., Inc..... 39
Tobe Deutschmann Corp.....94, 95

Victor Insulators Div., I-T-E Circuit Breaker Co., Inc..... 99

Wagner Electric Corp..... 112
Warn Mfg. Co..... 80
Westinghouse Electric Corp...45, 48, 49, 88, 89

PROFESSIONAL SERVICES..... 119

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES..... 118

EQUIPMENT (Used or Surplus New) For Sale 118

Readers Forum

The Word From Texas

To the Editor:

I have been listening to Easterners, Yankees, and Mid-Westerners carry on for so many years about how Texans blow off, that I was beginning to believe that maybe we were too eager to advertise our State and our own accomplishments in too "loudatory" a manner. However, I was quite interested in the January 13, 1958 issue of the Electrical World.

On page 13 under the heading Transmission, I noticed the following: "New H-frame design using angle iron cross ties instead of Vee braces". Turning to page 58, I read Mr. Campbell's interesting article and I am sure that he had no intention of suggesting that the angle iron cross tie was an original idea. It could have been. The point that I would like to make it that this is not *new*. On May 16, 1955, this cooperative completed 76 miles of 115 KV Transmission line in Hudspeth County, Texas utilizing a 3" by 2½" by ¼" angle iron cross tie, mounted very similar to the sketch as shown in Mr. Campbell's article. We are very proud of the construction and agree with the Iowa Power & Light Co. that it not only makes for a stronger structure but a more economical structure. However, we do not claim that the idea was new with us. To the best of my knowledge, the Lower Colorado River Authority with headquarters in Austin, Texas utilized the angle iron cross ties as far back as the late thirties.

The whole point being that I have enjoyed reading the article and I agree with all of the facts which Mr. Campbell has brought out, but I disagree with the magazine statement that this is a new idea. So you see, that just proves the point, we Texans knew it all along, but we didn't spout off about it. Now maybe you guys will quite riding us so hard about all that hot air from Texas.

Jay Seefeld
Assistant General Manager
Rio Grande Electric Cooperative, Inc.
Brackettville, Texas

Winter-Load Worries

To the Editor:

The following is in answer to "Winter Peak Falls Below Estimate" on page 44 of the January 13, 1958 Electrical World.

The utilities that do not exceed their estimate for peak loads have only themselves to blame. In most of the country the cost of electricity and its installation far exceed that of other types of fuel. Until the cost of electricity and its installation is competitive, peak loads will not be an easy goal to attain.

I am a sales consultant for an all-electric manufacturing company and my company is eager to promote our electric equipment, yet, cannot get any cooperation as to a rate adjustment to compete with other types of fuel. Every month I receive inquiries from people who are interested in electric equipment, but after getting comparative prices from local electric company, they lose interest.

Combination electric and gas utility companies are more often partial to gas because the pipes are already in and they are not interested in promoting electric equipment even if the rates are competitive. They will not cooperate but discourage the customer after we have spent considerable time and effort in promoting the customer's interest. I have letters from several utilities to back up my statement.

Kenneth Westling
Consultant
Intervale Road
Mountain Lakes, New Jersey

Likes Our Perforations

To the Editor:

I would like to take this opportunity to tell you that I think your idea of perforating the pages is an excellent one, since I have for years made a practice of tearing out or cutting out articles which I wish to save. I think that this was a very fine idea.

John C. Slothower
Northern States Power Company
Minneapolis 2, Minnesota

Electrical World

McGRAW-HILL PUBLISHING CO. INC. • 330 W. 42ND STREET, NEW YORK 36, N. Y.

GENERAL ALPHABETICAL INDEX

Volume 148 July-December 1957

A

Accounting

Billing errors in Kansas P&L's Lawrence division cut by data processing machine (N) Aug. 12..... *76
Electronic tax returns save Consolidated Edison time and effort (N) Sept. 16 ..... *87
Rule changes on liberalized depreciation debated at FPC hearing (N) Sept. 23..... 71
Rule changes on liberalized depreciation—utilities ask: why change rules? (N) Sept. 30..... *52
What next for liberalized depreciation? (N) Aug. 26..... 48

Advertising (see also **Public Relations**)

Burndy adds traveling display units (N) Aug. 19..... *136
ECAP's next atom ad to highlight progress (N) Sept. 23..... 69
Kefauver, Sen. Estes to draw bead on power ads (N) July 29..... 43
Rochester G&E wins NEMA window display contest (N) Sept. 2..... *120
Ten big decisions for 1958—report 4. Can we draw the line in the political fight against electric company ads? Dec. 30 58

Air Conditioning

Acme Metal Products find air conditioning key to accurate machining. C. C. Millar, July 8..... *104
Air conditioner supermarket (N) July 22 ..... *123
Air conditioning speeds card output at Crescent Card Co. Oct. 28..... *88
Build compact a.c. tester. F. M. Chittenden, July 29..... *73
Carrier finds automation thrives on conditioned air (N) Oct. 21..... 70
Carrier Corp. sees 4% sales jump in '58 (N) Dec. 30..... 78
Drive-in features clean, cool air overhead pumped into cars. July 1.... *76
FHA rule helps air conditioning (N) Nov. 25 116
Florida Power boosts air conditioning with "Weather by Wire" (N) July 15 98
Gas-fueled air conditioning—sooner than you think? July 1..... 76
New Jersey shopping center gets air conditioning (N) July 22..... 123
Rejects drop, output grows with novel air conditioning at Hires Castner & Harris. L. Albertson. Dec. 23..... *71
Rockefeller Center takes air conditioning lead (N) Oct. 7..... *144
Univ. of Dallas air conditioned (N) Oct. 7 ..... *102

Alaska

Potential minus load (N) Sept. 16.... 94

Anniversaries

Chance Co. celebrates golden anniversary (N) July 8..... 125
Sporn cuts cake marking regulator silver anniversary (N) Dec. 30..... *116

Appliances

Appliance servicing—the rotten apple (Ed) Nov. 4 57
Appliances sold by TV (N) Sept. 2.... 120
Dehumidifiers sales up (N) Aug. 12.. 114
Dishwashers—selling plans and promotions. Dec. 2..... 74
Home economist has vital appliance role. Nov. 25 89
Men do the shopping in appliance stores (N) July 8 94
NARDA survey pegs appliance dealer '57 headaches (N) July 15..... 94
See electronic ranges at ¼ million yearly by '65 (N) Aug. 26..... 30
Southern California Edison kicks off dryer campaign (N) Dec. 9..... 88
Water heaters—top ten models chosen (N) Sept. 30 49

Area Development

How heat pumps help spur area development. J. B. White. Sept. 30.. *78

Argentina

Projects bids invited (N) Aug. 26.... 96

Associations

AEIC 73rd annual meeting—Beckjord succeeds Barney at helm as membership and research hit highs. Nov. 11 ..... *58
AIEE—Barrett views new policies (N) July 8 ..... *62
AIEE board sets new policy (Ed) Pt I, July 1 39
Pt II, July 15..... 57
AIEE—Coover backs "overall" group (N) July 8 ..... *63
AIEE's electronic rummage sale pays off (N) Oct. 21 46
AIEE Fall General Meeting (N) Nov. 4 ..... *65
AIEE meeting at Pasco, Washington (N) Sept. 23 ..... *71
AIEE Pacific General Meeting will present "atom" papers (N) July 22. 76
AIEE Summer General Meeting, July 15 ..... *66
AMCA sets up program on fan tests, performance (N) Oct. 21..... 94
APPA 14th Annual Convention. July 15 ..... *63
ASA reports progress on 11 standards (N) Oct. 21..... 91
American Gas Assn. reports 8½% gas heat gain in 1956-57 (N) July 15.. 98
American Society of Mechanical Engineers' annual meeting discusses true cost of coal (tables) Dec. 23..... *39
"Congress on Better Living" will be held in Washington, D. C. (N) Sept. 2 120
EEI Accident Prevention Committee meeting — resuscitation positioning stressed, Dec. 2..... *55
EEI announces awards for sales promotion (N) Dec. 16 130
EEI book is basic reference for today's underground power systems. Aug. 5 ..... *53
EEI's Fall Range Campaign (N) July 15 94
EEI's 'how to' sessions plans laid for education push (N) Oct. 7..... *107
EEI Industrial Relations Committee's 10th Annual Round Table Conference will be held Sept. 23-25 (N) July 8 ..... *70
EEI—McAfee, J. W. is new head; Corette, J. E. gets vice presidency (N) Dec. 16 ..... *16
EEI report views systems planning trends (charts & tables) July 15... 75
EEI System and Equipment Group Denver meeting—rotor prewarming studies cited (N) Oct. 21 ..... *47
EEI 10th Annual Round Table Conference to explore employee efficiency Aug. 12 ..... *82
EEI to accept affiliates (N) Aug. 5.. 50
EIMA—insulation makers vote to keep working group (N) Dec. 23..... 89
Electrical Insulating Materials Assn. is born (N) Nov. 18..... 119
Engineering groups plan new or expanded centers (N) Aug. 12..... 77
Engineering societies center fund drive launched (N) Dec. 2..... *53

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Engineering societies headquarters will be on UN Plaza (N) Oct. 7..... 108
4th Annual National Power Use Workshop-Conference of the Inter-Industry Farm Electric Utilization Council. Oct. 28 74
IAEL 22nd Annual Conference. Oct. 28 ..... *74
IEA meeting (N) Nov. 4 ..... *61
IES holds Atlanta conference Oct. 7..*114
Industrial Electrification Council schedules seven-session course on industrial distribution systems (N) Dec. 9 ..... *69
Let's humanize our industry meetings (Ed) Aug. 12 71
NAED 49th Annual Convention—exec scores "distribution by expediency" (N) July 8 ..... *69
NAEM Wire & Cable Section meeting (N) Dec. 16 161
NARDA survey pegs appliance dealer '57 headaches (N) July 15..... 94
NARUC annual meeting (N) Nov. 18.. *73
NELPA hits gas invasion of Pacific NW (N) July 8 ..... *69
NELPA meeting urges quadrupled public relations effort (N) Sept. 30.. *56
NEMA Annual Convention. Nov. 25.. *80
NEMA appliance meeting (N) July 15 94
NEMA organizes Pole Line Hardware Subdivision (N) Nov. 18..... 119
National Conference on Applied Meteorology (N) Nov. 11 ..... *52
National Power Use Work-shop-Conference will be held in Denver, Sept. 29-Oct. 1 (N) Sept. 2..... 120
Northwest Public Power Assn. annual power use workshop, Nov. 25..... 89
PCEA Hawaiian Conference told get into nuclear-power 'act'. Dec. 16.... *90
PEA Electrical Equipment Committee meeting (N) Dec. 9..... 72
PEA 50th annual meeting. Oct. 28.. *51
PEA—the road ahead (N) Oct. 14.... 82
PEA Systems Operation Committee meetings, Nov. 26 ..... *88
PEA System Planning Committee meeting (N) Dec. 16 91
PEA T&D Committee hears utilities will spend most on transmission and distribution (N) Dec. 2 56
Rocky Mountain Electrical League annual meeting (N) Nov. 11..... *57
SEE four-session meeting at Atlanta, Ga. (N) Oct 14..... 78
Southeastern Electric Exchange sales meeting, Nov. 25..... *91
Tenth Annual Power Distribution Conference cites EE schooling deficiencies, Nov. 25..... *90
That's what association means (Ed) Oct. 21 39
Wisconsin Utilities Assn. annual convention (N) Nov. 18..... *80

Atomic Energy (See **Nuclear Power**)

Atomic Energy Commission

Cuts 765 Mw of its power demands (N) Aug. 12 73
ETRC to reveal vital "family secrets" (N) July 22 76
Half of '57 ORSRT graduates in electrical industry (N) Sept. 23 126
Organic-moderated reactor nearly finished (N) July 8..... *65
President Eisenhower names 2 Truman men to AEC; 'shrewd move,' says observers (N) July 1..... *40
Regulatory role evolves (table) (N) Sept. 23 68
Retains policy (N) Sept. 23..... *71

Australia

Planning three power stations (N) Sept. 2—168, Sept. 23 94
Stakes $1-billion claim on Snowy Mountain's 2,620-Mw payload, Sept.2 *82

Awards

American Barge Line honors Philip Sporn (N) July 15 62
Look Magazine announces awards for wiring promotion (N) Nov. 25.... 114
McCall, Laura award will go to top home service woman (N) Oct. 7.... 142
Sperry Award to Electro-Motive Div. of GM for diesel work (N) Nov. 25.*144

B

Boilers

Babcock & Wilcox making boiler for Duquesne Light (N) Nov. 11..... 107
Babcock & Wilcox to build variable pressure boiler for Southern California Edison (N) Dec. 16..... 161
Causes of boiler-tube leakage traced C. E. Shay, Aug. 19..... 98
Combustion Engineering boiler sales total $25 million for 6 weeks (N) July 15 124
Dumps condensate, boosts unit output Bart Montiegel, Sept. 30..... 74
Once-thru boiler used for subcritical operation at Dayton P & L. H. E. Gismond, Dec. 23 ..... *52
Turbo furnace sales up (N) July 29.. 85
Utility chair speeds boiler maintenance, July 8 92

Bonneville Power Administration

Computer supplants analyzer, July 15. 68
Revenues climb (N) Oct. 28..... 53

Bureau of Reclamation (see **Reclamation Bureau**)

Buses

Corona shields prevent radio interference on 138-kv bus. A. A. Milusich Aug. 5 ..... *70
Determine deflections for aluminum pipe bus. L. T. Guess (R) (chart) July 1 72
Prefabricated weld fittings join aluminum bus at new Utah P&L substation. R. A. Radford, Aug. 19..... *86
Silver plated aluminum bus manufactured by Reynolds (N) Dec. 2 97
Three steps lead to economical and reliable aluminum buses. D. H. Sandell, Nov. 25..... *92

Bushings

Experience backs bushing standards. A. W. Hill, July 22 86
GE's LTC mechanism built on bushing (N) Aug. 19 ..... *134
Steel crate protects bushings. A. W. Shelhorse, Aug. 5..... 70
Store bushings on switching structures. C. P. Zimmerman, Dec. 16..*115
Tests bushing porcelain for pin holes. George Shombert Jr., Aug. 13.....*104
33-kv bushing modernization modified. J. H. Cravens, Dec. 30 ..... *69

C

Cables

Aerial cable network in business area looks to ultimate underground. J. F. Meagher, Aug. 12..... *98
Aluminum armored cable saves at expanded International Falls paper mill, Aug. 19..... *81
Aluminum cable used for secondary mains. L. F. Porter, Aug. 12.....*101
Buried-cable residential distribution proves success. Smith & Smith (charts & table) Aug. 12..... *92
Copper finish put on Circle's sheathed cable (N) Dec. 9..... 112
Lightning protection of aerial cable, July 15 71
Making straight joints on aerial cable (R) Nov. 4..... *80
Making tee joints on aerial cable (R) Nov. 18 96
Okonite Co. dedicates new plant, July 1 ..... *96
Public Service Electric & Gas pipe cable gains extra Mva. J. A. Pulsford, July 1 ..... *60
Rating and construction of pipe-type cable, July 15 ..... *69
Roebling adds to paper cable plant (N) Aug. 5 ..... *104
Roebling uses vertical vulcanizer for cable (N) Sept 2..... *164
Rome Cable publishes 2nd edition of "Rome Cable Manual of Technical Information" (N) Dec. 9..... 112
Simplex cable supplied in Hawaiian phone service (N) Oct. 21..... 91
Simplex telephone cable will link U. S.-Europe (N) Oct. 14..... 142
Stop joint joins 69-kv pipe-type to oil-filled cable. R. H. Bolling, Nov. 11 ..... *61
Submarine cable powers plant pumping station for Pittsburgh Plate Glass Co. Arthur Kaspar, Oct. 21... *49
Suspending aerial cable on line poles (R) Oct. 7.....*138
Two cables to connect San Francisco and Hawaii phones (N) Aug. 19.... 138

Canada

British Columbia project of 3,000 Mw is under study (N) Dec. 2..... 52
CEMA cites an 11% rise in domestic production (N) Oct. 28..... 107
Electrical manufacturing increases 60% in Canada (N) July 15..... 127
Fights for its own heavy equipment market (N) Nov. 11 107
Mountain gets built-in powerhouse (N) Sept. 23..... *67
Power restored at Kitimat (N) Dec. 23 36
Thermal trend grows as BC Electric plans 900-Mw plant in hydro area (N) Oct. 7 194

Capacitors

Grounded-Y better for capacitors Harold Stone, Sept. 2 90
How to apply 50-kvar capacitors underground successfully. Neagle & Graham, Nov. 4..... *74
Sangamo corrects PF at meter box (N) Nov. 4 ..... *104
Seattle City Light's Bothell substation—capacitors on 115-kv bus cost less. Skone & Moody, July 1..... *66
Two-thirds rule used for capacitor kvar. L. J. Rankine (R) Dec. 2.... 72
Vacuum units switch capacitors. J. W. Rittenhouse, Aug. 26..... *59

Capacity Additions

Boom in big units (N) Oct. 14..... 82
Capacity additions reported to FPC (tables) July 8—138, Aug. 5—44, Sept. 9—64, Oct. 7—106, Nov. 11.... 55
Connecticut's joint capacity planning: how it works and what it can do for you. Dec. 2..... *58
Delaware P&L erecting 150-Mw unit at Edge Moor station (N) July 22.. 146
8th annual electrical industry forecast 1957-1970. A. J. Stegeman (charts & tables) Sept. 2..... 91
Great Britain sets 2,000 Mw rate (N) Aug. 12 79
Hearn, Richard L. steam generating plant will be tripled in capacity (N) July 1 91
Iowa companies map growth in 'survival' plan to save $140 million (map) Oct. 28 44
New generation soars, will set record in '58 (N) Dec. 30..... *51
Public Service of New Mexico stepping up construction schedules (N) Oct. 7 108
Texas' power plans (N) Nov. 4 64

Circuit Breakers

Federal Pacific redesigns AB breakers (N) Sept. 30 104
I-T-E to market new line of breakers (N) Nov. 18..... 122
Smaller current transformers match breaker ratings. A. Conangla (charts) Aug. 5 60
Stored-energy closing halts arcing on circuit breaker, Dec. 2..... *71
Westinghouse compressed-air breaker installed in Jamaica Station of Consolidated Edison Co. (N)' July 1.... 98

Communications

Dictating by wire (N) July 1..... 46
Kerosene lamps power Russian radios (N) Dec. 9 ..... *72
Nebraska weather watchers (N) July 15 62
RCA ships transistorized frequency-shift tone system (N) Dec. 30..... 115
Two cables to connect San Francisco and Hawaii phones (N) Aug. 19.... 138
Two utilities install GE microwave systems (N) Dec. 23..... 90
Wire rope carries communication lines (N) Aug. 19 134

Condensers

Allis-Chalmers fabricates 200,000-sq. ft. condenser (N) Dec. 23..... *90
Spain installs largest hydrogen-cooled synchronous condenser at La Mudarra substation (N) Dec. 23..... 90

Conductors

Alcoa boosts conductivity of its conductors to 62% (N) Nov. 18..... 123
American G&E field-tests new tower and twin-bundled conductors at 345 kv. E. S. Zobel, Dec. 9 ..... *6
Block stops conductor jumps (N) Sept. 9 ..... *51
Determine deflections for aluminum pipe bus. L. T. Guess (R) (chart) July 1 72
Reynolds Metals Co. develops new aluminum overhead power conductor (N) Sept. 2..... 10
Three steps lead to economical and reliable aluminum buses. D. H. Sandell, Nov. 25..... *92
Tying and untying 13.2 kv made safer and faster. H. M. Wade, Aug. 19..*108

Connectors

Burndy Co. develops single-sleeve aluminum connectors (N) Sept. 16.*150
Savings made in large terminals at Burndy Corp. (N) Dec. 16.....*162

Construction

Construction plans hold firm (N) Sept. 30 50
Construction progresses on U. S. atom plants (N) Oct. 14..... *74
Fire prevention guide on construction jobs (R) Dec. 30..... 72
Generator saves ½hr/pole (N) Aug. 12 79
Horizontal borer saves on duct bank costs at Consolidated Edison, Sept. 16 ..... *104
How Iowa P&L increased railroad with long duct. Goldberg & Walkup, Dec. 30 ..... *66
Idaho Power technique shoots five holes per crew-day in solid rock. W. G. Bartl, July 8 ..... *90
Man-lift speeds construction men to job. F. A. Williamson, Nov. 18.... 95
Pacific P&L's Swift Dam—steel-pile curtain underseals world's largest earthfill dam. Sept. 2..... *88
Pipelines: how they're built in Italy, July 8 ..... *72
Pole-type building shed cuts building costs. F. L. Kline, Aug. 26..... *76
Prefabricated weld fittings join aluminum bus at new Utah P&L substation. R. A. Radford, Aug. 19..... *86

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Steel roof decking cuts concrete floor costs. A. J. Ormston, Sept. 9..... *72
Submarine cable powers plant pumping station for Pittsburgh Plate Glass Co. Arthur Kaspar, Oct. 21.. *49

Controls

AccuRay will automate battery plate-pasting (N) Dec. 9 111
Alarm system detects incipient icing conditions (N) Aug. 26 96
Automatic controls aid area loading at Northern States Power Co. E. C. Glass (map) July 8 ..... *74
Automatic regulator cuts cooling water 80%. H. E. Hauer, Sept. 30.. *80
Card-programmed control for steel mill (N) Sept. 16 124
Central Maine Power Co.'s automatic controls put spinning reserve on line in 9½ seconds. H. G. Marshall, Aug. 26 52
Control LTC's to operate in parallel. W. C. Sealey, Sept. 9 ..... *64
Load-frequency control runs Niagara stations, Oct. 7..... *174
Timer halts salt loss in water softeners. Brown & Titus, Dec. 16..... 115

Cooperatives (see also Rural Electrification Administration)

Co-ops explore anti-trust suit against private utility groups (N) Nov. 25.. *78
Hoosier co-op plan battle brews (N) July 8 66
Hoosier Energy Cooperative, Inc. may increase its loan application (N) Dec. 16 89
Indiana co-ops warm on electric heat (N) Aug. 26 82
Kansas Electric Co-op and South Mississipi Power Assn. seeking loans (N) Nov. 11 56
Lewis-Clark G&E Cooperative formed in Pacific Northwest (N) July 1.... 42
Of loans and leases (N) Nov. 11..... 56
Oklahoma's Gov. Gary says REA's dream of taking over "whole power system" (N) Aug. 5 44
Salt River Rural Electric Co-op begins paying capital credits (N) Aug. 26.. 51
South Dakota's rising use permits rates to fall (charts) Aug. 5 51
Sunflower Electric Cooperative, Inc. gets charter (N) Sept. 2 81

Corporate Changes

Connecticut Power Co. merger with Hartford Electric Light Co. approved (N) Oct 21 46
Electric Storage Battery Co. and Ray-o-Vac Co. combine (N) Sept. 23 135, Nov. 4..... 108
Elliott Co. and Carrier Corp. merge, effective Aug. 1 (N) Aug. 5..... 104
Federal Pacific Electric Co. acquires Penn Electrical (N) Nov. 4..... 108
Federal Pacific Electric acquires McBurney Corp. (N) Dec. 9—70, Dec. 16 162
Hartford Electric Light Co. and Connecticut Power Co. merger slated (N) Sept. 23..... 70
Reliance Electric & Engineering Co. and Master Electric Co. merge (N) Aug. 5 104
Servel A. C. purchase sketched by Arkansas Louisiana Gas Co. Nov. 25 116
Servel, Inc. sells its gas air-conditioning division (N) Sept. 9..... 82

Corrosion

Corrosion research—a prudent investment (Ed) Aug. 26 43
Pole-line hardware corrosion test (N) Aug. 12 135

D

Defense

"Simple home warning device" (N) Dec. 9 71
When the H-bomb hits—CD alert (N) July 29 ..... *45

Distribution

Aerial cable network in business area looks to ultimate underground. J. F. Meagher, Aug 12 ..... *98
Air-driven auger cuts manhours 60%. R. K. Woodson, Oct 7..... *135
Aluminum cable used for secondary mains. L. F. Porter, Aug. 12..... *101
American G&E installs Ohio Brass' new arresters on 345-kv duty (N) Oct. 14 ..... *141
American G&E stores bushings on switching structure, C. P. Zimmerman, Dec. 16 ..... *115
American G&E temporary service setup specified to save on costs. C. H. Wagner, Sept. 30 70
Appalachian Electric Power's step-regulator marks 25th anniversary (N) July 22 ..... *142
Arizona PS adapted street light speeds night line maintenance work, Nov. 11 76
Bakelite covering eases installation on cables for traffic control system in San Antonio, Tex. (N) July 22....*144
Buried-cable residential distribution proves success. Smith & Smith (charts & table) Aug. 12..... *92
CEI standardizes relay schemes and settings. T. E. Dy Liacco, Nov. 18.. *86
Carolina P&L controls 23-kv capacitor banks economically. Burch Wayne, Oct. 14 ..... *100
Central Hudson G&E claims "we're 99.96% dependable" (N) July 29.. 52
Cleveland controversy—overhead vs. underground (N) Dec. 9..... 71
Commonwealth Edison Co. sign warns of backfeed. Dec. 9 ..... *86
Consolidated Edison of N. Y. encounters sharpest drop in daily one-hour peaks due to shift from extremely hot to unseasonably cool weather (N) July 15 62
Demand curves aid T&D design. R. E. Sinclair (charts) Oct. 14..... 83
8th annual electrical industry forecast 1957-1970. A. J. Stegeman (charts & tables) Sept. 2 91
EEI book is basic reference for today's underground power systems, Aug. 5 ..... *53
EEI report views systems planning trends (charts & tables) July 15.... 75
Field recording of conduit and manholes (R) Sept. 23..... 96
Florida P&L study—look to aerial cable and vaults for serving small business areas. R. H. Stevens (charts) Nov. 25 96
Grounded-Y better for capacitors. Harold Stone, Sept. 2..... 90
Hot-line tools get moisture register test at Appalachian Electric Power, Brust & Campbell, Sept. 16..... 116
How Consolidated Edison drops load (N) Aug. 12..... *72
How to apply 50-kvar capacitors underground successfully Neagle & Graham, Nov. 4..... *74
How to get more from distribution regulators, Enos & Brown (charts & tables) Oct. 7 110
Hydraulic derricks prove economical at Indianapolis P&L, July 29..... *66
Industrial supply poses problems. E. L. Lloyd, Nov. 11 ..... *63
Insulated open wire cuts costs at Baltimore G&E. A. A. Hall Jr., Sept. 16.*101
Iowa Electric L&P underground conversion heralded by newspapers, Sept 16 ..... *96
Iowa P&L—how long duct was installed beneath main-line tracks of three railroads. Goldberg & Walkup, Dec. 30 ..... *66
Jamaica's load grows (N) July 15.... 62
Kansas City P&L studies reveal single-phase service costs less. E. B. McBurney (charts & tables) Oct. 28. 54
Kyova makes first conduit shipment (N) Oct 7 ..... *187
Making tee joints on aerial cable (R) Nov. 18 ..... *96
Mechanize pavement breaking operations. R. K. Woodson, Sept. 2.....*112
Mississippi Power Co. and East Mississippi Electric Power Assn. vye for Navy Base load (N) Aug. 5..... 50
NAED 49th Annual Convention—exec scores "distribution by expediency" (N) July 8 ..... *69
Narragansett Electric proves 12.47 kv a success in southern New England. P. S. Shelton (map) July 29 ..... *58
Nashville Electric Service System—a 16% increase (N) Sept. 2..... 81
New York State E&G high tensionline insulators being destroyed by vandals (N) July 1 46
Ohio Brass features dynagap in arresters (N) July 15 ..... *126
112-kva distribution unit available (N) July 1 98
PEA Assn. hears utilities will spend most on transmission and distribution (N) Dec. 2..... 56
Plastic cover fits many service joints. L. C. Barry, Aug. 5..... *68
Plymouth Electric restores burned-out line (N) July 8 ..... *67
Prepare for underground residential service (Ed) Aug. 12..... 71
Public Service G&E hit by heat, failure (N) July 29 52
Sectionalize 4-kv underground system safety. C. B. Anderson, Aug. 12.... *96
Select higher secondary voltage (N) Sept. 30 ..... *48
Small parachute expedites pulling cable through pipes, Oct. 14..... 100
Suspending aerial cable on line poles (R) Oct. 7 ..... *138
Take a bold look at distribution. H. G. Hally, Aug. 5 ..... *62
Ten big decisions for 1958—report 7. How can distribution be changed to serve growing residential loads Dec. 30 62
Three steps lead to economical and reliable aluminum buses. D. H. Sandell, Nov. 25..... *92
Trends in underground distribution—report. L. M. Olmsted (charts & tables) Aug. 12..... *87-102
Survey of 42 utilities reveals residential underground practices, Aug. 12 88
Pre-fab cells house transformers; Networks reflect area needs, Aug. 12 90
Buried—cable residential distribution proves success Smith & Smith, Aug. 12 ..... *92
Sectionalize 4-kv underground system safely, C. B. Anderson, Aug. 12 *96
Aerial cable network in business area looks to ultimate underground. J. F. Meagher, Aug. 12..... *98
Aluminum cable used for secondary mains. L. F. Porter, Aug. 12..... *101
Two phases can supply 4-wire 120/-208 v. H. S. Lewis, Nov. 18 ..... *95
2,300-v radial economic for motors. J. A. McLellan, July 1..... 94
Tying and untying 13.2 kv made safer and faster. H. M. Wade, Aug. 19..*108
Union Electric mounts ladder on hydraulic truck derrick. W. R. Bickel, Sept. 23 ..... *94
Utah P&L calls on Bluff (N) Oct. 14.. 88
Valley Electric Membership Corp. jumper tool is safer bypass, July 8. 94
Western Massachusetts Electric uses scale model to speed job instruction. C. C. Wing, Sept. 2..... 114
Who'll serve servicemen's houses? (N) Nov. 25..... 79

Distribution, Industrial

Aluminum armored cable saves at expanded International Falls paper mill, Aug. 19..... *81
4-KV distribution serves new office building of Connecticut General Life Insurance Co. Oct. 21..... *73
High frequency expands for industrial tools, lighting, Nov. 4..... 89
Industrial Electrification Council Schedules seven-session course on industrial distribution systems (N) Dec. 9 ..... *89
Industrial modernization—bonanza for power sales (Ed) Sept. 9..... 43
Power-up!—your chance for an industrial load bonus, Dec. 2..... *48
Spot networks prove in for shopping center distribution, Nov. 4..... 87
Submarine cable powers plant pumping station for Pittsburgh Plate Glass Co. Arthur Kaspar, Oct. 21.. *49
Utility, industrial planners urged to confer, July 15 71

Dixon-Yates

Dixon-Yates asks U. S. for $2 million (N) Oct. 7 105
Dual role misgivings (N) Oct. 28.... 43

E

Employee Training and Welfare (see also Labor)

Card-size units aid training of linemen at Gastonia Water & Light Dept. R. Van Sleen, Sept. 2..... *84
Community Public Service Co.'s thrift plan supplements pension. Ruth Phillips Steinhauser, July 8..... 71
Consummers Power puts poison ivy shots on trial, Oct. 28 ..... *70
Develop young men, declares Ed Stultz, new Potomac prexy (N) Nov. 11 ..... *54
EEI's 'how to' sessions plans laid for education push (N) Oct. 7 ..... *107
EEI Industrial Relations Committee's 10th Annual Round Table Conference will discuss enlarging employee effectiveness (N) July 8 ..... *70
How Consolidated Edison of N. Y. helps its employees find a happy retirement, Nov. 25..... *86
Kentucky Utilities demonstrates the live line hazard. J. R. Thompson, Oct. 7, ... *100
Ohio Edison kit aids regulator training. D. W. Talley, Sept. 16..... *95
Use 'rouse-power' to win over your utility customers. R. C. Swartz, July 22 ..... *79

Engineers

Another rise in raises (N) Nov. 18..... 79
Burndy Corp.—engineer's role for women (N) Sept. 16..... *166
Engineering education schooling deficiencies cited, Nov. 25 90
Engineering groups plan new or expanded centers (N) Aug. 12..... 77
How engineers view their lot (N) Sept. 23 70
Insurance covering "errors and omissions" supported by professional societies (N) Dec. 23 36
Photos aid engineers and management. R. C. Dietrich. Oct. 21 ..... *62
"Standard Handbook for Electrical Engineers"—a guide to today's electrical art, Dec. 2..... *57
Today's obligation for tomorrow's needs (Ed) Oct. 7..... 99
Where does the engineer stand? 36 utilities surveyed. G. W. Peak, Oct. 14, ... *80

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Equipment Prices

Buyers sit tight as prices rise (N) July 29 44
GE cuts prices on transformers (N) Dec. 16 89
I-T-E setting equipment prices (N) Aug. 5 50

F

Federal Power Commission

Issues licenses for Alabama Power and Sacramento MUD projects (N) Sept. 16 95
Kuykendall, Chairman Jerome K. reappointed (N) Aug. 26..... 51
Power threatened (N) Sept. 16..... 93

Financial

Are utilities depression proof? (Ed) Dec. 30 47
Can you trim bond rate impact? July 22 77
Construction plans hold firm (N) Sept. 30 50
8th annual electrical industry forecast 1957-1970. A. J. Stegeman (charts & tables) Sept. 2..... 91
Financial outlook: time looks ripe for common (N) Oct. 21..... 42
Financial seminar broadens management view (N) Oct. 14..... 76
GE ups sales and earnings (N) Oct. 21 46
Here's alternative to "non-callable" clauses, Aug. 5 ..... *46
How far should federal spending go (N) Nov. 25..... *84
Jackson, W. L. Mfg. sales up 1,000% in 10 years (N) Nov. 11..... 110
Kansas P&L fights rising costs (N) July 1 46
McGraw Edison buys Australian stock (N) Aug. 5 104
Steady growth characterizes industry's '58 outlook (N) Dec. 30 50
Utilities stick to expansion plans (Ed) Sept 30 47
Utility spending rate will top '56 period (N) Sept. 16 ..... *93
Utility spending to dip, says SEC-Commerce (N) Dec. 23..... 34
Westinghouse—a leap into the black (N) Nov. 11 56
What is ahead for generating costs? (Ed) Nov. 11 51
Why energy costs differ (Ed) Oct. 14 73

Fly Ash

Large fly ash collectors to be installed for Consolidated Edison (N) July 29 86
Niagara Mohawk Power Dunkirk Steam Station to get Research-Cottrell fly ash collectors (N) Aug. 26.. 94
Trace-elements in ash may be valuable (Ed) Aug. 12 71

Foreign Trade

Argentine grants credit for generator imports (N) July 15..... 124
Cuban utility orders $5 million GE equipment (N) Sept. 23..... 126
International Atomic Energy Agency treaty will expand foreign markets (N) Aug. 12 ..... *75

Fuel

American Gas Assn.: 8½% gas heat gain in 1956-57 (N) July 15..... 98
Brookhaven to get new fuel elements (N) July 15 ..... *61
Coal—what is its true cost? (tables) Dec. 23 ..... *39
Electric utility plants use 12% more coal in '56 (N) Sept. 23..... 67
Figuring coal pile density (N) July 1 46
Figuring fuel costs (N) July 8..... 68
Fuel cost cut by linear programming of generation, Nov. 4..... 66
Fuel for Florida—conversion to natural gas (N) Sept. 16..... 94
Nuclear fuel element is key to economic A-power, July 1..... *55
Portland General Electric—'hog fuel' conversion (N) Nov. 4..... 64
Vepco unit burns refinery gas, coke (N) Sept. 23..... 67

G

Generators

Argentine grants credit for generator imports (N) July 15 124
Babcock & Wilcox to build variable pressure boiler for Southern California Edison (N) Dec. 16..... 161
Commonwealth Edison's 275-Mw unit has low heat rate. Schmidt & Gregory, Oct. 21..... *50
Coordinate generator prewarming with controlled turbine starting, C. B. Scharp (charts). Aug. 19..... 88
Duquesne Light—three recommendations for safer routine overhauls of generators (N) Dec. 2..... 54
Niagara Project generators ordered (N) Oct. 14 141
Once-thru boiler used for subcritical operation at Dayton P&L. H. E. Gismond, Dec. 23 ..... *52
Rotor prewarming studies cited at EEI System and Equipment Group meeting (N) Oct. 21 ..... *47
Seattle Department of Lighting installs 980-ton generator . . . the hard way, Sept. 30 ..... *54
Turbogenerator use cuts costs at Cleveland Electric Illuminating Co. Buck & Didriksen, July 8..... *78
Uptegraff Mfg. to add impulse generator (N) Dec. 9..... 112
Westinghouse ships generator to Hells Canyon (N) July 15 .....*127
Why did generator rotors burst? Expert gives the answers. A. W. Rankin, Dec. 2 ..... *62

Great Britain

AEA pushes Calder Hall (N) Aug. 5. 43
British Columbia Electric lands contract for six units of new thermal plant (N) Oct. 28 53
Call atom risks "insurable" (N) July 15 61
Fast breeder nears completion. J. H. M. Sykes, Sept. 16 .....*106
Power rating up at proposed Hinkley Point station (N) Sept. 30..... *53
Pumped-storage project proves out (map) Oct. 14..... *86
Runaway plutonium pile jars atom program (N) Oct. 21 ..... *40
Runaway plutonium—public reaction is critical (N) Oct. 28..... 46
Runaway plutonium—reactor incident caused by instruments (N) Nov. 25.. 83
Sets 2,000 Mw rate (N) Aug. 12..... 79
Thermal shield rises at Berkeley Power Station (N) Nov. 11..... *53
Thermonuclear link seen in accident (N) Nov. 11 53

Grounding

Air compressor saves time in ground rod driving (N) July 29..... 87
Appalachian strings line on towers with live 345 kv. W. P. Carter, Aug. 19 ..... *84
Grounded-Y better for capacitors. Harold Stone, Sept. 2..... 90
High-speed ground switch. Upton & Holts, Oct. 21..... *56
Substation grounding practices recommended. C. P. Zimmerman, Aug. 19 *97

H

Heat Pumps

Alabama Power Co. jumps heat pumps 60% in '56. E. A. Wilson (charts) July 8 98
All-electric Capehart Housing Development for Little Rock Air Force Base (N) Aug. 26 ..... *44
Carolina P & L salesman replaces coal boilers with heat pump in Raleigh, N. C. office building (N) Dec. 2.... *76
Electric space heating 1957—report. T. R. Jordan (charts & tables), Dec. 16 95-110
GE'S Brundage cautions SEE utilities to get rolling with heat pumps now (N) Nov. 11 ..... *84
How heat pumps helped spur area development. J. B. White, Sept. 30 *78
Tampa Electric's panel helps sell heat pumps. G. D. Leach Jr. Oct. 14..*108
York Corp. to supply heat pump for Sylvania (N) July 29 87

Heating

Electric space heating 1957—report. T. R. Jordan (charts & tables) Dec. 16.....95-110
How to compute a room's heating needs in 3 minutes. J. B. C. Thomas (R) (tables) Dec. 16..... 108
Ten big decisions for 1958—report 9. Will '58 see a space-heating break through . . . with most utilities pushing it? (chart) Dec. 30..... 64
Washington University backs electric heat meet (N) Sept. 9..... 82

Heating, Commercial

Commercial cooking—the "sleeping giant" (Ed) Sept. 16..... 85
Commercial cooking: 3rd survey (report) (charts & tables) Sept. 23.....*81-88
Electric heat screen: privacy & comfort (N) Aug. 12.....*114
Kwhrs heat school in 8,200 degree—days. C. W. Berglund Jr., Sept. 16..*130
Large deaerator shipped to Con Edison (N) July 8.....*126
Luxury motel hosts its guests all—electrically. M. I. Stalheim, Dec. 16.....*126
Utilities eye school heat ABC's (N) Nov. 18..... 100

Heating, Industrial

Barton Mfg. Co. plant finds heater for every application. G. C. Wagner, Aug. 26..... *84
Cable keeps ram running despite severe winter weather. G. J. Alden, July 15..... 103
Candy output climbs as steam yields to electric heat at Bachman Chocolate Mfg. Co. N. S. Hartman, Dec. 23..... *71
Circulation heater cuts acetylene gas costs. G. J. Alden, July 8..... *104
Drying glue with high frequency saves 75%. R. G. Snyder, Sept. 16..... *132
Electric heater spurs laggard gas in scrap yard. G. J. Alden, Sept. 16.. *132
Electric oven cuts glass drying time by 90%. T. W. Scully, Dec. 9..... *94
Electric vapor-heated kettle boosts output and quality in crowded plant. G. A. Soule, July 29..... *74
Electrified metal melting pots, thermostatically controlled, boost casting quality, raise pot capacity. Clyde Jones, July 1..... *80
450 kc speeds tool output. L. M. Duryee, Oct. 7.....*146
Heat ducts boost cable quality, trim process time at Electric Auto-Lite Co. Thomas Ballots, Dec. 9..... *94
Heat precision machine shop electrically. G. H. Maier, Sept. 2.....*124
High frequency speeds up heat treating. R. O. Smith, July 22.....*124
High frequency trims handling, space needs. G. P. Hiteshue, Dec. 2..... *78
High temperature conveyor oven speeds capacitor production. R. B. Russell, Aug. 5..... *80
Immersion heater simplifies gasket handling. Edward Paul, Nov. 11.. 88
Immersion units make mill fat flow faster. C. C. Millar, Aug. 26..... 84
Infra-red heater beats humidity, ups output at mirror firm, Dec. 2..... 78
Infra-red oven cracks bottleneck at Daffin Mfg. Co. Donald Groome, Oct. 28..... 88
Infra-red steps up shoe relasting at A. S. Kreider Shoe Co. Norman Hartman, Dec. 16..... 135
Kwhrs heat lumber office at Calhoun Lumber Co. R. L. Spencer, Dec. 23..... *68
Novel oven bonds plastic to wood panel. G. C. Wagner, Sept. 23....*106
Precision heat is key to quality product at Zell Products Co. P. C. Pokrop, Aug. 19.....*116

Heating, Residential

All-electric Capehart Housing Development for Little Rock Air Force Base endorsed (N) Aug. 26 ..... *44
American G&E broadens water heater element range (N) Dec. 30..... 74
Consolidated Edison unveils all-electric apartment kitchen (N) July 29..... *70
Do we want the water heating business? (Ed) July 28..... 43
How to sell 240 electrically-heated homes. H. A. Stroud, Sept. 2.....*122
Indiana co-ops warm on electric heat (N) Aug. 26..... 82
Now you can predict energy usage in terms of temperature, wind, sun and appliances. J. B. C. Thomas & others (charts & tables) Dec. 16....*104
The unrealized promise of electric heating (Ed) Dec. 16..... 83
Water heaters—top ten models chosen (N) Sept. 30..... 49
Water heating: simplify it to sell it (Ed) I—Aug. 16—69, II—Sept. 9—43, III—Sept. 30..... 47
Water stored off-peak can heat and cool space. Turnbull & Jamison, Nov. 11..... *66

Hells Canyon

House may vote on Hells Canyon soon (N) July 1..... 40
Idaho Power gets go-ahead (N) Nov. 18..... 72
Westinghouse ships generator (N) July 15.....*127

Hydro Stations (see also **Capacity Additions**)

Alabama is through waiting—Bouldin (N) Nov. 18..... *75
Alabama Power granted license for Coosa River project (N) Sept. 16.. 95
Australia stakes $1-billion claim on Snowy Mountain's 2,620-Mw payload, Sept. 2..... *82
Australians test new treatments to halt plant growth in supply races (N) Dec. 23..... 36
British Columbia project of 3,000 Mw is under study (N) Dec. 2..... 52
Canada—mountain gets built-in powerhouse (N) Sept. 23..... *67
Central Maine Power Co.'s automatic controls put spinning reserve on line in 9½ seconds. H. G. Marshall, Aug. 26..... 52

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Chelan PUD studies low bid for Rocky Reach (N) Aug. 12..... 160
Denver, Colo. water board studies hydro (N) Aug. 12..... 79
Duke Power's Allen Unit to have Wheeler circulator pumps (N) Aug. 19..... 134
Duke Power Co. seek's hydro project okay (N) July 15..... 130
Five hydro happenings (N) Dec. 16.. 89
Georgia Power and federal government pact solves power problem (N) Nov. 11..... 56
Glen Canyon a pact 'threat' (N) Nov. 4..... *61
Idaho Power's Brownlee Dam—another gain (N) Nov. 25..... 85
Indianapolis P&L dedicates H. T. Pritchard station (N) July 22.. *72
McNary Dam—'fish bowl' idea may revamp dam design (N) Nov. 25.. *82
Mountain Sheep—Pleasant Valley Dam controversy—contrary testimony (N) Aug. 12..... 79
Mountain Sheep—Pleasant Valley controversy—Snake dam fight moves downstream (N) Aug. 5..... 43
Mountain Sheep—Pleasant Valley project—stage set for decision (N) Dec. 9..... 64
Mountain Sheep—Pleasant Valley project—struggle for the Snake rages (N) Oct. 7..... 105
New England Electric System dedicates Samuel Campbell Moore station (N) July 22..... *72
New Jersey P&L advances pump-storage plan (Map) (N) Aug. 19..... 73
Old Portland GE hydro unit will power Belgian Congo hospital (N) Sept. 2..... *78
Pacific P&L's Swift Dam—steel-pile curtain underseals world's largest earthfill dam, Sept. 2..... *88
Paradise Dam project drawing stiff opposition again (N) Dec. 2..... 54
Priest Rapids Dam capacity to be increased (N) Dec. 30..... 54
Priest Rapids Dam may deliver first power in the fall of 1959 (N) Nov. 25..... 85
Puerto Rico's San Juan station—short circuit and fire take out 88 Mw (N) July 1..... 46
Pumped-storage hydro attractive. E. S. Loane (charts & tables) Sept. 23..... *73
Pumped-storage project proves out at Blaenau Ffestiniog, North Wales (map) Oct. 14..... *86
Pyrites discharge operation improved at Muskingum River plant. Ellis & Grubb, Sept. 16..... *113
Russians hit full capacity at Kuibyshev hydro plant (N) Dec. 2..... 54
Sacramento MUD issued license for proposed Upper American River Project (N) Sept. 16..... 95
Schoellkopf spins 48 Mw—a year later (N) July 1..... *42
Shasta's No. 5 unit faults (N) Aug. 26..... 51
Smith, S. M. ships second runner to Chief Joseph Dam (N) Oct. 7..... 187
Southwest hydro studied (N) Oct. 21.. 41
Sweden's State Power Board providing hostesses at tourist-attracting hydro-electric plants (N) Aug. 5..... 50
Tri-Dam Project nears completion (map) (N) Aug. 19..... *74
Union Electric cancels plans to build proposed pump storage project (N) Nov. 18..... 79
U. S. hydro tempo takes an upturn (N) Dec. 30..... *53
Washington Public Power votes to study Ben Franklin dam project (N) Aug. 26..... 51
Western drought relaxes tight grip—water outlook for major hydro plants. Newmeyer & Riesbol (table) July 29..... *50

I

India

600 miles of electric railway (N) Oct. 14..... 82

Industrial Applications

Automatic handling cuts labor at cement-block plant. P. C. Webb, Sept. 23..... *106
Automation key to brewery grain handling. E. H. Pechan, Nov. 18.. *104
Clarksburg, W. Va. modernization of water supply system ends water shortage threat. P. M. Hutchinson, Aug. 12..... *116
Converted crane ends production breaks. G. J. Alden, Aug. 26..... 84
Conveyors key to smoother production in toy factory, Nov. 25..... *120
Egg beater invented (N) Aug. 5..... *44
Electric power boosts quarry production. F. A. Bewley, Nov. 11..... *88
Electric pump and ingenuity clean coal. Thomas Ballots, Nov. 4..... 86
Electric steam generator cuts steam costs at C. H. Masland & Son. Harry Fisler, Aug. 19..... 116
Electric steam glue press cures glue faster. J. H. Tarbell, Aug. 5..... *80
Flexible bending machines with heated coils form plywood, hardboard to tricky shapes. Chiodini & Merritt, Oct. 14..... *112
Hot wire cuts curves in foam. G. C. Wagner, Sept. 9..... 89
Jersey Shore Steel Co. raises output, improves mill operation with purchased electric power. H. F. Moore, July 15..... *103
Mechanization doubles tube plant output, Sept. 30..... *84
Mechanized handling trims plant labor cost at Sylvania Electric plant. W. F. Hutchins, Dec. 30..... *80
Modernization clips brewery production costs. J. E. Parker, Nov. 4.. *86
Purchased power speeds delivery, trims mill costs. Clyde Oberholzer, July 22..... 124
Trim cost, noise with electric fork lifts. J. C. Handy, Oct. 28..... *88

Industrial Relations (see **Employee Training and Welfare**)

Insulating Oils

Oil reclaiming process saves 10.5% for Virginia Electric & Power Co. O. R. Compton, Nov. 18..... *82

Insulation

Fabri-Seal insulation fails but reputation unharmed (N) Nov. 25..... 144
Insulated open wire cuts costs at Baltimore G&E. A. A. Hall Jr., Sept. 16..... *101
Insulator stack rates for 138 kv. H. B. Weaver, Nov. 18..... *90
Insulator with new ceramic body marketed by GE (N) Oct. 7..... 187

Interconnections

Austria tests line to Italy (N) July 1..... 95
France-Britain link feasible (N) Nov. 25..... 85
International link between Maine PS and New Brunswick Electric Power Comm. completed (N) Dec. 30..... 54
Pooling reduces reserve need—collective operation of Texas systems, July 15..... *66
Study effect of area interconnections. L. K. Kirchmayer & others (charts) Sept. 2..... 84

Iran

Plans its own TVA (N) Oct. 21..... 46

L

Labor (see also **Employee Training and Welfare**)

American & Foreign Power Argentine subsidiary calls for protection against mob violence in Gualeguaychu (N) Aug. 5..... 50
Florida P&L strike (N) July 22..... 78
'Power-up' to offset labor dearth, NEMA hears, Nov. 25..... *80
$15-million pay hike at Westinghouse (N) Oct. 21..... 46
Westinghouse ups wages (N) Nov. 18..... 122
Yankee Atomic Electric plant construction union opposition fails to materialize (N) Nov. 4..... 60

Latin America

American & Foreign Power Co. hails political progress (N) July 15.... *60

Legislation

Civilian reactor program battle flares (N) July 22..... 74
Federal power feels "sharp edge", July 29..... *48
House halts federal reactors (N) Aug. 19..... 72
Joint Committee on Atomic Energy writes construction bill (N) Aug. 5..... *42
Lobbying bill seen to stir Congress fight. V. C. Richter, July 8..... 64
Partnership keynotes 85th's box score (N) (table) Aug. 26..... 46
Power bills tangle in civil rights snarl (N) July 15..... 59
TVA titan in '58: carte blanche or controls? (N) Dec. 30..... 48

Lighting

Florida Power's educational lighting lectures, July 22..... *114
New look in outdoor lighting—report, July 22..... *87-102
Outdoor lighting follows changing pattern of our living, T. R. Jordan, July 22..... *88
Garden lighting: a residential plum, July 22..... *90
Garden lighting grows among Hawaiian palms, Stanly Skuk, July 2 *92
It's outdoor lighting that pulls the commercial dollars today, July 22. *94
6 points to sell commercial outdoor lighting, July 22..... *96
Demonstrate and sell outdoor lighting, July 22..... *96
Outdoor lighting will boost gas pump sales, July 22..... *97
Recreation lighting: sell it by "townful", July 22..... *98
Idlewild "daylight" never ends, July 22..... *99
Industrial lighting here's where you find the big ones, July 22..... *100
Sell the lighting—but keep the lights, July 22..... *102
1957 International Lighting Competition (N) Dec. 2..... *50
1957 International Lighting Competition—How winners handled lighting (N) 1. Dec. 2 *50, 2. Dec. 9 *68, 3. Dec. 16..... *88
Outdoor lighting and a utility's birthright (Ed) July 22..... 71

Lighting, Commercial

Build bank on "light" . foundation (N) Nov. 4..... *82
Christmas lighting around the world, Dec. 23..... *32
Color lighting boosts auto sales. D. C. Statham, July 22..... 114
Demonstrate and sell outdoor lighting, July 22..... *96
Electric light grows pom-poms in Florida. Lowis Carlton, Oct. 14....*104
Floodlight Grand Coulee (N) July 22..... 114
Familiar "Spirit of '76" is relighted (N) July 1..... *44
General Electric's Nela Park lights 24th annual outdoor Christmas display (N) Dec. 23..... *64
Idlewild "daylight" never ends, July 22..... *99
Indianapolis P&L lights parks, streets in annual program. J. D. Blythe, Sept. 16..... *128
Infrared lamps when placed on hardwood flooring kills beetles and termites in 5-10 minutes (N) Aug. 26..... *80
It's outdoor lighting that pulls the commercial dollars today, July 22..... *94
Lighting experts fight fog on highways (N) July 22..... 78
Luxury motel hosts its guests all-electrically. M. I. Stalheim, Dec. 16..... *126
Outdoor lighting report see under **Lighting**
Outdoor lighting will boost gas pump sales, July 22..... *97
Recreation lighting: sell it by "townful", July 22..... *98
6 points to sell commercial outdoor lighting, July 22..... *96
TVA test: boost pine growth with light (N) Sept. 9..... *80
Utah P&L provides free electricity for holiday lighting (N) Dec. 23..... 36

Lighting, Industrial

Airpax Products lighting system spurs transformer production, cuts rejects. W. H. Servary, Nov. 25....*120
Douglas Aircraft installs 22 acres of light (N) Sept. 9..... *46
Engineered lighting boosts efficiency at Continental Can Co. machine shop. H. M. White, Oct. 7..... *146
GE testing 1,000-foot candle lighting system (N) July 15..... 103
Hetherington & Berner's new lighting puts an end to production delays. Paul Kimball, Dec. 16..... *135
Industrial lighting: here's where y u find the big ones, July 22..... *100
Lighting system in machine shop of Shepard Niles Crane & Hoist Co. lifts crane output. L. L. Sweetland, Sept. 9..... *89
Outdoor lighting report see under **Lighting**

Lighting, Residential

Consolidated Edison unveils all-electric apartment kitchen (N) July 29.... *70
"Family room" is target of GE fall lighting push (N) Sept. 2..... 120
Garden lighting grows among Hawaiian palms. Stanley Skuk, July 22.. *92
Garden lighting: a residential plum, July 22..... *90
Lighting and the monk who staked his all (ED) July 8..... 61
Outdoor lighting report see under **Lighting.**
Reddy Kilowatt, Inc. "eye guard" for better lighting (N) Dec. 9..... *72

Lighting, Street

Boost lighting in 160 Montana towns, July 1..... *74
Carlinville, Ill new "white way" line trouble (N) Aug. 5..... 50
Dayton P&L experimental street lighting uses continuous strand of fluorescent down the middle of the street, July 1..... *74

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Detroit experiments with high frequency street lighting (N) Nov. 25 ..... *114
Fulton, N. Y. gets fluorescent street lighting in downtown area (N) Dec. 2 ..... *96
Indianapolis P&L lights parks, streets in annual program. J. D. Blythe, Sept. 16 ..... *128
Philadelphia's 7,500 gas street lamps will burn day and night (N) Dec. 2 54
St. Albans, Vt. ups its lighting 500%, gets "new look", Oct. 21 ..... *66
Seeing is believing—(N) Sept. 2 31

Litigation

Co-ops explore anti-trust suit against private utility groups (N) Nov. 25.. *78
Iowa P&L r/w film aids company in court suit (N) July 29 ..... *46
Los Angeles Dept. of Water & Power brings "friendly suit" against Metropolitan Water District, Southern Calif. (N) Dec. 30 54
Right-of-way acquisition across Indian reservations—law suit (N) Aug. 19 76
$750,000 verdict against Commonwealth Edison and Northern Illinois Gas Co. (N) July 22 78

Load Characteristics

Commercial cooking: 3rd survey (report) (charts & tables) Sept. 23 ..... *81-88
Desalting: a load builder (N) Nov. 18 79
'57 winter peak may take growth leap, beating summer's gain (charts) Dec. 9 66
How much reserve do you have? K. M. Smith (charts) Sept. 9 55
Lighting and the monk who staked his all (Ed) July 8 61
Needed—better check on customer loads (Ed) Oct. 7 99
1957 summer peak loads top 1956 total by 7% (table) (N) Sept. 23.. 66
Now you can predict energy usage in terms of temperature, wind, sun and appliances. J. B. C. Thomas & others (charts & tables) Dec. 16 ..... *104
Rates for the big six load builders (Ed) Dec. 9 63
Residential load study is key to the future; does your company use it? Fulford & Sharkey, Dec. 9 79
Sputnik spiked a load curve—over New England Electric System's area (N) Dec. 2 54
Ten big decisions for 1958—report 2. How can we lick the summer-peak problems of weather sensitive loads? Dec. 30 ..... *56
Unit values of current, kva and their vector relations for lkw, 100v, at various pf. F. C. DeWeese (table) July 15 90
Water stored off-peak can heat and cool space. Turnbull & Jamison, Nov. 11 ..... *66

M

Maintenance

Allis-Chalmers service vehicle for maintenance of regulators (N) Sept. 9 116
Arizona PS adapted street light speeds night line maintenance work, Nov. 11 76
Atmoseal system has new features. W. J. Degnan & others, Sept. 9.... *59
A-power lubricants cost 10% more (chart) Nov. 25 100
Cast iron pipe repairs simplified. J. B. Osborn, Nov. 11 ..... *76
Causes of boiler-tube leakage traced. C. E. Shay, Aug. 19 98
Coil presses designed to speed motor repairs. J. N. McGinnis Jr., July 1 70
Cooler backwashing method is saver at Sporn Plant. J. H. Grimes, July 8 ..... *89
Dayton P&L paints trucks, meters with DeVilbiss units (N) Aug. 26 94
Dry cleaning saves control-air filters. James Haley, Dec. 23 59
Gauges studded boiler tube erosion. R. S. Lease, Oct. 7 ..... *135
Hacksaw device speeds draft tube repair, Nov. 25 112
Helicopter patrols transmission lines effectively, economically for Philadelphia Electric Co. J. N. Van Name, July 8 ..... *82
Hydraulic crane speeds plant maintenance, Sept. 2 ..... *108
Jig speeds turbine grinding jobs, Oct. 28 ..... *66
Jig speeds valve dismantling. W. R. Hayes, Nov. 5 ..... *110
Line maintenance tools: protection and care (R) Aug. 26 78
Line Material uses automated process for painting transformer tanks (N) July 8 ..... *125
Live-line tools: protection and care (R) Aug. 12 109
Micarta saves as covering on aluminum leads. Seymour Cambias Jr., Dec. 9 ..... *84
Portable fluid transfer tank, July 22.. 112
Pyrites discharge operation improved at Muskingum River plant. Ellis & Grubb, Sept. 16 ..... *113
Revised hopper doors cut labor. O. F. Green, Dec. 9 ..... *87
Silicone aids in eliminating seal replacement costs (N) Oct. 7 187
Small shed permits work during rain at Texas Electric Service Co., Nov. 11 ..... *78
Sticks devarnished in one hour, Sept. 2 119
Stop conservator transformer oil leaks. B. E. Ellsworth, Sept. 23 ..... *91
Toledo Edison's special truck cuts auto service costs. J. L. Peck, July 15 ..... *83
Turning preserves ash-removal piping. R. M. Lynch, July 8 90
Ultrasonics speed meter register cleaning. Dye & Howard (tables) Aug. 5 ..... *56
Utility chair speeds boiler maintenance, July 8 92
Wood preservative use increased in 1956 (table) (N) July 8 126

Management

Arkansas Louisiana Gas Co. to enter power field (N) Nov. 25 82
Armstrong, George: Louisville G&E's hard-working chief, July 22 ..... *81
Develop young men, declares Ed Stults, new Potomac prexy (N) Nov. 11 ..... *54
Ernst, Carl C. of California Electric Power Co. (N) Sept. 30 ..... *51
Fairman, Floyd I.—Kentucky Utilities busy new chief (N) Sept. 16 ..... *89
Financial seminar broadens management view (N) Oct. 14 76
Library should serve all. I. A. Zink, July 1 ..... *45
A look ahead: utilities must grapple with bigness—Ebdon (N) Nov. 18.. *75
Nichols, Larry—Superior WL&P's soft-spoken skipper, Aug. 5 ..... *45
Photos aid engineers and management. R. C. Dietrich, Oct. 21..... *62
Realistic use of weather data can help sharpen operating efficiency and cut costs (N) Nov. 11 ..... *52
Residential load study is key to the future; does your company use it? Fulford & Sharkey, Dec. 9..... 79
Sacramento Municipal Utility District—chain reaction (N) Sept. 9.. 51
Self-preservation—political or educational (Ed) Nov. 25 77
Servel A. C. purchases sketched by Arkansas Louisiana Gas Co., Nov. 25 116
Stetson, Hazen—top man down east at Maine Public Service, July 8.... *72
Ten big decisions for 1958—report (charts) Dec. 30 ..... *55-65
To hold industry leadership, "Keep a step ahead"; Clark (N) Dec. 23.. *34
Utah P&L "brainstorms" help prepare for snowstorms (N) Nov. 18..... *78
West Penn writes down its policy—here's how it tackled the job. John Mueller, Nov. 4 62
Westinghouse reports on developments (N) Dec. 30 115
What makes a good manager? Winsborough & Flaherty (charts) Sept. 9 52

Materials Handling (see also **Trucks and Trailers**)

Automatic handling cuts labor at cement block plant. P. C. Webb, Sept. 23 ..... *106
Bunker grating at Tanners Creek Plant improved. V. C. Fay, Dec. 9.. *84
California Electric Power gets giant A-C condenser, largest ever shipped in one piece (N) Nov. 11..... *107
CEI proposes truck lift (N) Oct. 28.. 53
Coal—what is its true cost? (tables) Dec. 23 ..... *39
Conveyors key to smoother production in toy factory, Nov. 25 ..... *120
Georgia Power prevents damage, saves space with bushing storage racks. A. W. Shelhorse, Sept. 2.... 119
Gin on line truck carries large reels, Aug. 12 ..... *108
Girk's meter saver (N) Aug. 26..... 51
Huge stator rumbles through San Francisco to Pacific G&E's Hunters Point plant (N) Dec. 2 ..... *94
Hydraulic crane speeds plant maintenance, Sept. 2 ..... *108
Hydraulic derricks prove economical at Indianapolis P&L, July 29..... *66
Hydraulic lift gates save on meter handling. H. G. Nold, July 29.... *66
King-size condenser goes to AEP Co. (N) Oct. 21 ..... *94
Mechanized handling trims plant labor cost at Sylvania Electric plant. W. F. Hutchins, Dec. 30 ..... *80
Mobile equipment speeds jobs at Southern California Edison, July 8.. *84
Power rig raises transformers easily. Leslie Buford, Dec. 23 ..... *59
Royal Electric wraps connectors in plastic (N) Aug. 12 ..... *139
Steel crate protects bushings. A. W. Shelhorse, Aug. 5 70
Trim cost, noise with electric fork lifts. J. C. Handy, Oct. 28 ..... *83
Westinghouse ships by three-part railroad car (N) Aug. 19 136
Westinghouse shows how to haul a giant, Dec. 23 ..... *41

Metals

Aluminum production (N) July 8—127
Aug. 5 107
Copper production (N) July 1—98, Aug. 5—107, Sept. 9 118

Meters and Measuring

Girk's meter saver (N) Aug. 26..... 51
Houston L&P special setup tests tong test ammeter, Sept. 2 116
Hydraulic lift gates save on meter handling. H. G. Nold, July 29..... *66
Meter records—a field for automation (Ed) Aug. 5 41
Meter-relays to actuate radiation monitoring (N) July 8 127
Metering 1-ph 3-w service over 100 amp (R) Sept. 9 ..... *76
Murray Mfg. will market manual meter by-pass (N) Dec. 16..... 161
New meter has two-electromagnet stator, Aug. 5 ..... *66
New meter testing unit weighs less. F. R. Keller, Dec. 23 ..... *62
1-stator, 1-rotor unit meters 4-wire, 3-phase. H. W. Griffith Jr., Sept. 9 ..... *63
Sangamo builds big shunts to aid power measuring (N) Sept. 30.....*106
Sangamo gives its watthour meters a lifetime guarantee (N) Oct. 28..... 107
Sangamo increases prices on meters (N) July 1 98
Sangamo introduces network meter (N) July 29 ..... *85
Sangamo tells policy on polyphase meters (N) July 8 125
Specification data for watthour meters (tables) (R) July 29 68
Temporary test meters installed quickly. J. J. Wolkan, Nov. 11.... *75
2-stator wye meter offers flexibility. J. H. Patton, July 15 ..... *86
Ultrasonics speeds meter register cleaning (tables). Dye & Howard, Aug. 5 ..... *56
Vepco sampling technique cuts meter testing cost. W. C. Harrison, July 15 ..... *72

Microwaves (see **Communications, Controls**)

Models

Models used to sell transformers (N) Sept. 2 ..... *166
Scale model speeds job instruction. C. C. Wing, Sept. 2 114

Motors

Canned motor pump works well Virginia Electric & Power finds, J. R. Slack, Dec. 9 ..... *78
Coil presses designed to speed motor repairs. J. N. McGinnis Jr., July 1 70
Dow Corning shoots rays at silicone-insulated motor (N) Nov. 25..... 141
Marathon millionth motor (N) Sept. 23 125
Synchronous motors drive Memphis Condenser pumps (N) Sept. 30..... 106
2,300-v radial economic for motors. J. A. McLellan, July 1..... *51
Westinghouse adds fourth plant for F-HP motors (N) July 22..... 142

Municipal Systems

Los Angeles Dept. of Water & Power brings "friendly suit" against Metropolitan Water District, Southern Calif. (N) Dec. 30..... 54
Los Angeles Dept. of Water & Power eyes Arizona site for dam and power plant (N) July 29 52
Seattle Department of Lighting installs 930-ton generator . . . the hard way, Sept. 30..... *54
Seattle Lighting & Water Department —cost cutting complication (N) Oct. 7 108
SMUD awards equipment contract to Federal Pacific Electric (N) July 15 126
SMUD being sued over fire caused by short circuit in transformer (N) Nov. 11 56

N

Natural Resources

Critical Columbia flow (N) Aug. 19.. 76
River development—producing power only one purpose of river projects (N) Aug. 26 51
Western drought relaxes tight grip. Newmeyer & Riesbol (table) July 29 ..... *50

New Zealand

They're drilling for steam to power a 250-Mw plant, Sept. 9..... *60

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Niagara Project

Allis-Chalmers to **furnish** 12 motor-generators for **Tuscarora** plant (N) Dec. 2 ... 97
"Cut and cover" vs. tunnels (N) Sept. 9 ... 51
Dispute delays Niagara trial (N) Oct. 14 ... 76
Generators ordered (N) Oct. 14 ... 141
New York State's Power Authority ready and set to go (N) July 29 ... 52
Niagara bill expected to be signed next week (N) Aug. 19 ... 76
Niagara snag is "cheap politics" says Moses; big loan postponed (N) Sept. 16 ... *93
Passage of Niagara bill seen "sure thing" (N) Aug. 12 ... 74
Quick action on Niagara compromise seen (N) July 1 ... 41

Northwestern Activities

Chelan County PUD and Alcoa reach agreement on sale of power from Rock Reach hydro project (N) July 22 ... 78
Columbia Interstate Compact Comm. may switch from a recommending to an "action agency" (N) July 22 ... 75
GOP strategem in Oregon (N) July 22 ... 78
Lewis-Clark G&E Cooperative formed in Pacific Northwest (N) July 1 ... 42
Mountain Sheep-Pleasant Valley Dam controversy—contrary testimony (N) Aug. 12 ... 79
Mountain Sheep-Pleasant Valley controversy—Snake dam fight moves downstream (N) Aug. 5 ... 43
Mountain Sheep-Pleasant Valley project—stage set for decision (N) Dec. 9 ... 64
Mountain Sheep-Pleasant Valley project—struggle for the Snake rages (N) Oct. 7 ... 105
NELPA hits gas invasion of Pacific Northwest (N) July 8 ... *69
Pacific NW looks to thermal plants (N) Oct. 14 ... *77
Washington Public Power votes to study Ben Franklin project (N) Aug. 26 ... 51
Washington State's Puget Sound-Cascade region—"Powerland USA" (N) Sept. 2 ... 81

Nuclear Power

AIEE Pacific general meeting will present "atom" papers (N) July 22 ... 76
APPR control features quick check-up (N) Sept. 2 ... *79
Arco reactor goes critical (N) Oct. 7 ... *10
Argonne's "Arbor" to supply boiling water reactor data (N) Sept. 16 ... *90
A-power lubricant cost 10% more (chart) Nov. 25 ... 100
A-power: when we need it (N) Nov. 4 ... *61
A-progress recruitment aid speaker tells AEIC-EEI meter groups (N) Oct. 21 ... 48
Atom review urged (N) Oct. 28 ... 53
Atomic alternative—partnership or preference (Ed) Dec. 16 ... 83
Atomic Energy Authority pushes Calder Hall (N) Aug. 5 ... 43
AEC's organic-moderated reactor nearly finished (N) July 8 ... *65
Atomic insurance okayed by Congress (N) Aug. 26 ... 47
Brookhaven to get new fuel elements (N) July 15 ... *61
Carolinas Virginia Nuclear Power Associates, Inc. set 4-stage plan (N) Dec. 23 ... *35
Carolinas Virginia Nuclear Power Associates slate heavy water reactor (N) Sept. 16 ... 90
Civilian reactor program battle flares (N) July 22 ... 74
Consolidated Edison revises Indian Point's nuclear design. J. F. Fairman, Oct. 21 ... *44
Construction progresses on U. S. atom plants (N) Oct. 14 ... *74
Containment vessel can be reduced Kolfat & Chittenden (charts & tables) July 29 ... *53
Cost rise delays two co-op projects; two plans get clearance (N) Sept. 30 ... 53
ECAP's next atom ad to highlight progress (N) Sept. 23 ... 69
ETRC to reveal vital "family secrets" (N) July 22 ... 76
Fuel is key to economic A-power, July 1 ... *55
GE reveals its start toward harnessing fusion process (N) July 1 ... *43
Germany to get 2 research reactors (N) July 22 ... *76
Go ahead asked for Power Reactor Development Co.'s reactor (N) Nov. 4 ... 64
Gore, Sen. Albert calls atom power race a grim challenge (N) Nov. 4 ... 60
Great Britain calls atom risks "insurable" (N) July 15 ... 61
Great Britain power rating upped at proposed Hinkley Point station (N) Sept. 30 ... *53
Great Britain's fast breeder nears completion. J. H. M. Sykes, Sept. 16 ... *106
Great Britain's reactor accident—thermonuclear link seen (N) Nov. 11 ... *53
Great Britain's reactor incident caused by instruments (N) Nov. 25 ... 83
Great Britain's runaway plutonium pile jars atom program (N) Oct. 21 ... *40
Great Britain's runaway plutonium public reaction is critical (N) Oct. 28 ... 46
Homogeneous reactor proposed by Penn P&L, Westinghouse (N) Dec. 23 ... 35
Homogeneous reactor study is pessimistic (N) Oct. 28 ... 46
House halts federal reactors (N) Aug. 19 ... 72
International Atomic Energy Agency treaty will expand foreign markets (N) Aug. 12 ... *75
Italy orders A-plant (N) Dec. 2 ... 56
Joint Committee on Atomic Energy writes construction bill (N) Aug. 5 ... *42
Law of supply and demand brings reappraisal of troubled atom industry, Nov. 18 ... 76
Needed: more atomic leadership by utilities (Ed) Dec. 2 ... 47
Northern States Power Co. slates South Dakota site for atom plant (N) Dec. 9 ... 65
PCEA Hiawatin Conference told get into nuclear-power "act", Dec. 16 ... *90
PRDC's vice president Acker says, we may go it alone (N) Aug. 12 ... *74
Philadelphia Electric directors go "atomic sightseeing" (N) July 8 ... *66
"...The race is not to the swift..." (Ed) Oct. 14 ... 73
Reactor accident can't happen in U. S. say AEC officials (N) Oct. 28 ... 52
Re-examination of civilian atomic power program-politics flare (N) Dec. 2 ... 53
REA head urges caution in entering nuclear field (N) Oct. 14 ... 76
SEE told nuclear costs will drop (N) Oct. 14 ... 78
San Diego G&E backs fission research (N) July 29 ... *47
Sawdust cuts atomic waste costs, Oct. 28 ... *58
Search for a program formula bogs down (N) Dec. 16 ... 87
Shippingsport goes critical (N) Dec. 9 ... *65
Shippingport nuclear plant will get "kick" from Exide batteries (N) Nov. 25 ... 141
Shippingport puts out full power (N) Dec. 30 ... *52
Shippingport' reactor coolant system—"suspicious" weld repaired (N) July 1 ... *43
Southern California Edison gets first megawatt of A-power (N) July 29 ... 47
Southwest A-group formed (N) July 8 ... 68
Southwest Atomic Energy Associates explores reactor (N) Oct. 14 ... 82
Sputnik fears endanger atom technology—Knapp (N) Dec. 9 ... *70
System being designed for pebble-bed reactor (N) July 1 ... 43
Ten big decisions for 1958—report 1. Will we leave atomic power to the government—or fight for it? Dec. 30 ... 56
Thermal shield rises at England site (N) Nov. 11 ... *53
Utility planners wonder: where do we go from here? (N) Dec. 2 ... 51
Vallecitos atom plant dedicated (N) Nov. 25 ... *83
Vallecitos Atomic Power Plant—first private plant goes on line (N) Nov. 4 ... *60
Westinghouse loop will test slurry flow in reactor (N) Sept. 23 ... *69
Wisconsin Utilities Assn.—three optimistic prediction made for nuclear plants (N) Nov. 18 ... *80
Yankee Atomic Electric Co. hearings due (N) Sept. 16 ... 94
Yankee Atomic Electric plant construction union opposition fails to materialize (N) Nov. 4 ... 60
Yankee Atomic reactor safe, safeguards group says (N) Oct. 7 ... *101

P

Poles

Cleveland Electric Illumination pole discards sent to children's camp (N) Sept. 2 ... 81
Dayton P&L crossarm braces adjustable for length, July 22 ... *110
Does the motorist prefer poles? (Ed) Nov. 4 ... 57
Line crews commandeer boats to repair pole when high waters back up river level near Jefferson, Tex. (N) Aug. 26 ... 51
Montrose-Kansas City pole problem (N) Sept. 16 ... 94
Required ground-line diameter for standing poles is estimated by this quick method. W. H. Johnson (tables) (R) Oct. 21 ... 54
Woodpeckers—utilities try chemical tactics to squelch destructive birds (chart) Aug. 5 ... *48

Power Policy

Columbia Interstate Compact Comm. may switch from a recommending to an "action agency" (N) July 22 ... 75
Federal power feels "sharp edge" July 29 ... *48
Federal power takes new tack (N) Dec. 16 ... 88
Glen Canyon a pact "threat" (N) Nov. 4 ... 61
Growing federal power seen "live issue" (N) Sept. 9 ... 47
Nixon's expanding role. V. C. Richter, Dec. 9 ... 64
Partnership keynotes 85th's box score (N) (table) Aug. 26 ... 46
Self preservation—political or educational (Ed) Nov. 26 ... 77

Power Supply

An austere Argentina (N) July 29 ... 52
Georgia Power and federal government pact solves power problem (N) Nov. 11 ... 56
Power-up America, there's a job to do (Ed) Dec. 2 ... 47

Public Relations (also see **Advertising**)

AIEE electronic rummage sale pays off (N) Oct. 21 ... 46
Blackburn, Jasper Corp. holds housewarming (N) Oct. 28 ... *107
Cleveland Electric Illuminating fills youngster's big order—partially (N) Sept. 16 ... *88
Cleveland Electric Illuminating pole discards sent to childrens camp (N) Sept. 2 ... 81
EEI Industrial Relations Committee's 10th Annual Round Table Conference will discuss enlarging employee effectiveness (N) July 8 ... *70
Electrical Historical Foundation inventory progress (N) Aug. 5 ... *47
Fischbach, Harry F. contributes and pledges over $400,000 for facilities at Technion—Israel Institute of Technology, Inc. (N) July 22 ... *75
Hoover, Herbert leads Hall of Fame tribute to Westinghouse (N) Dec. 16 ... *87
How do your customers feel about YOU?—Motivation Research answers, Aug. 12 ... *80
Interstate Power district managers pave way to good public relations (N) Sept. 16 ... *86
Interstate Power Co.'s R/W field procurement pays off (N) Aug. 5 ... 52
It doesn't happen often enough! (Ed) Dec. 9 ... 63
Kansas City P&L won't bill customers whose houses or business establishments were destroyed by the May 20 tornado (N) July 22 ... 78
Long Island Lighting Co. film on tree trimming (N) Oct. 7 ... 104
Memorial honors "Father of Traction" (N) Sept. 2 ... *78
National Electrical Week-Plan, budget now for National Electrical Week (Ed) Oct. 21 ... 39
Newspapers herald Iowa Electric L&P conversion to underground network Sept. 16 ... *96
Quadrupled public relations effort urged at NELPA meeting (N) Sept. 30 ... *56
Use 'rouse-power' to win over your utility customers. R. C. Swartz, July 22 ... *79
What's a customer? (Ed) July 8 ... 61
What is your popularity quotient? (Ed) Sept. 23 ... 65

Public Utility Districts

Chelan County PUD and Alcoa reach agreement on sale of power from Rocky Reach hydro project (N) July 22 ... 78
Chelan PUD studies low bid for Rocky Reach (N) Aug. 12 ... 160
Chelan County PUD will supply Alcoa plant with interruptible power (N) Oct 21 ... 46
Douglas County PUD files for 402-Mw project (N) Sept. 2 ... 81
Grant County PUD to increase capacity of Priest Rapids Dam (N) Dec. 30 ... 54
Month's free service to Clatskanie Peoples Utility District (N) Dec. 9 ... 71
Snohomish County, PUD, to study possible power development of two streams (N) Dec. 30 ... 54

R

Radio (see **Communications**)

Rectifiers

Silicon good for high-voltage rectifiers. R. E. Willison, Nov. 4 ... *78

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Regulation and Rates

Arkansas P&L sets special electric heat rate (N) July 29 78
Can electric utilities hold the line against further rate increases? (charts & tables) Nov. 4 58
Inflation pressures rates upward, Rocky Mountain Electrical League hears (N) Nov. 11 ..... *57
NARUC annual meeting—will utility rates keep climbing? (N) Nov. 18.. *73
Rates for the big six load builders (Ed) Dec. 9 63
South Dakota's rising use permits rates to fall (charts) Aug. 5 51
Ten big decisions for 1958—report 5. How fast must electric rates be raised to keep the industry healthy? (chart) Dec. 30 60
Utilities turn to promotional rates that compete, Dec. 16 84
Western Massachusetts Electric Co. special rate for the promotion of electric heating (N) Nov. 25 82

Relays

Audio tone protects 220-kv link for Martins Creek-Siegfried line Oewel & Burleson (map) Dec. 23 ..... *47
Boston Edison test board speeds routine relay tests. W. C. Ellis, Oct. 28 *64
CEI standardizes relay schemes and settings. T. E. Dy Liacco, Nov. 18.. *86
Coordinated relaying protects processing at Monsanto plant. G. O. Hunt, Sept. 23 ..... *78
Florida P&L relays prevent system shutdowns. Cogburn & Kelley, Nov. 4 ..... *71
Hazards dictate generator relays. B. L. Lloyd, Sept. 16 ..... *97
High-speed ground switch. Upton & Holtz, Oct. 21 ..... *56
Industrial relaying faces bigger job. R. R. Peatfield, Oct. 28 ..... *59
Meter-relays to actuate radiation monitoring (N) July 8 127
Relay men talk on local backup, microwave, July 15 70
TVA system gains maximum continuity by load control. Karr & Almon Jr., Nov. 18 ..... *84

Research

Dravo Corp. dedicates research center (N) July 8 126
GE Co. developments reported (N) Oct. 21 94
General Electric develops Class F insulation varnish (N) Nov. 25.... 141
GE develops double-oriented iron (N) Aug. 26 94
GE reveals its start toward harnessing fusion process (N) July 1 ..... *43
Hubbard & Co. plans to build development center (N) Sept. 2 168
Hubbard & Co. research center to include outdoor testing (N) Dec. 23.. 92
Light & Vision Institute opened (N) Aug. 12 135
Pennsylvania State Univ. uncovers effective weapons to defend poles from destructive birds (chart) Aug. 5 ..... *48
Pennsylvania Transformer constructs research lab (N) July 22 142
Residential load study is key to the future: does your company use it? Fulford & Sharkey, Dec. 9 79
San Diego G&E backs fission research (N) July 29 ..... *17
Ten big decisions for 1958—report 6. Is research the number-one challenge for electric utility management? Dec. 30 60
Westinghouse developments(N) Nov. 11 110
Westinghouse Electric has cube-oriented steel (N) Nov. 25..... 141
Westinghouse loop will test slurry flow in reactor (N) Sept. 23..... *69

Right-of-Way

Connecticut's joint use of transmission facilities meets success (charts) Nov. 18 80
Foresight pays in right-of-way acquisition (Ed) Sept. 23..... 65
Formulas aid in R/W dealings (N) Sept. 16 ..... *92
Interstate Power Co.'s R/W field procurement pays off (N) Aug. 5..... 52
Iowa P&L r/w film aids company in court suit (N) July 29 ..... *46
Long Island Lighting Co. film on tree trimming (N) Oct. 7..... 104
Pennsylvania to share in relocations (N) Dec. 2 54
Relocation opposition (N) Dec. 16.... 89
Right-of-way acquisition across Indian reservations—law suit (N) Aug. 19 76
Ten big decisions for 1958—report 10. Can utilities break the costly rights-of-way bottleneck? Dec. 30..... 64

Rural Electrification

At inter-industry meet "cooperate" is key word Oct. 28 74
Electric co-ops and other borrowers may need $1 billion a year (N) Oct. 14 82
FBE materials available (N) Sept. 9.. 80
Inter-Industry Farm Electric Utilization Council's Power Use Workshop will be held in Denver, Sept. 29-Oct. 1 (N) Sept 2..... 120
Kwhrs replace man-hrs on an all-electric farm, Oct. 7..... *142
NRECA's point of view on profits (N) Oct. 7 108
New power uses may "bring a virtual electrical revolution" on the farm (N) Oct. 28 53
Texas dairymen grow forage indoors by using heat pumps to supply ideal climate, Sept. 9 ..... *80

Rural Electrification Administration

Hoosier co-op plan battle brews (N) July 8 66
Oklahoma's Gov. Gary says REA'S dream of taking over "whole power system (N) Aug. 5..... 44
Q: Are Hamil's wings clipped? (N) Aug. 19 76
Reappraisal of REA act sharpens (N) Sept. 9 ..... *48
REA head urges caution in entering nuclear field (N) Oct. 14..... 76
'REA policy unchanged': Hamil (N) Sept. 2 80

Russia

Electrical development paces U. S. (N) Aug. 5 50
Electricity used as a sleep treatment (N) Dec. 30 54
Full capacity hit at Kuibyshev hydro plant (N) Dec. 2 54
Gains in power field says Harold Foote (N) Sept. 16..... *91
Is Russia ahead in dc transmission? (Ed) Sept. 30..... 47
Report from Russia (N) July 8..... 68
Reports "silent" rock-splitting explosions and projected atomic railway locomotive (N) Dec. 23..... 36
Transmission features EHV and dc. J. H. M. Sykes, Sept. 30..... *62

S

Safety

Appalchian strings line on towers with live 345 kv W. P. Carter, Aug. 19.. *84
Carolina P&L meter section—thirty years of safety (N) July 29..... 52
Dry chemical passes test of transformer fires. E. F. Weaver, Aug. 26 *60
Duquesne Light—three recommendations for safer routine overhauls of generators (N) Dec. 2..... 54
EEI Accident Prevention Committee meeting—resuscitation positioning stressed, Dec. 2..... *55
Fatal safety lapse (N) Sept. 2..... 81
Fire prevention guide on construction jobs (R) Dec. 30..... 72
Georgia Tech conducts first SEE safety course, Sept. 2 119
Great Britain's reactor accident—thermonuclear link seen (N) Nov. 11 ..... *53
Great Britain's runaway plutonium pile jars atom program (N) Oct. 21 *40
Great Britain's runaway plutonium—public reaction is critical (N) Oct. 28 46
Great Britain's reactor incident caused by instruments (N) Nov. 25..... 83
Industrial safety must be planned carefully. H. E. Springer, Dec. 16.. *92
Kansas G&E-Finnell's formula works (N) Sept. 9 51
Kentucky Utilities demonstrates the live line hazard. J. R. Thompson, Oct. 7 ..... *109
Lightning protection of aerial cable July 15 71
MD's urge mouth-to-mouth resuscitation in first aid, Nov. 4..... 69
Ohio Brass features dynagap in arresters (N) July 15..... *126
Omaho Public Power District's safety show battles crane contacts (N) Aug. 12 ..... *77
Panacea for hot heads (N) Oct. 14... 52
Pole-top scaffold keeps lineman safe (N) Dec. 23..... *33
Portable tester checks rubber gloves in field. F. W. Jones, Dec. 9 ..... *36
Reactor accident can't happen in U. S. say AEC officials (N) Oct. 28..... 52
Red-end hose shows peril. Richey & McCammon, Sept. 9..... *68
Relocating ground rods (N) July 8... 68
Substation lighting protection has 4 determinants. T. J. Bliss (charts) Oct. 14 ..... *90
Transformer protection program started by "Automatic" Sprinkler Corp. of America (N) July 1 ..... *98
Tying and untying 13.2 kv made safer and faster, H. M. Wade, Aug. 19..*108
Union Electric tries deionizers (N) Aug. 12 ..... *78
Water can lick oil fires, tests show (N) Oct. 14..... *142
Why did generator rotors burst? Expert gives the answers. A. W. Rankin, Dec. 2 ..... *62
Yankee Atomic reactor safe, safeguards groups says (N) Oct. 7.....*101

St. Lawrence Project

Power dam pace quickens on the St. Lawrence (N) Sept. 9..... *44

Sales and Promotion

Air conditioner supermarket (N) July 22 ..... *123
Alabama Power Co. jumps heat pumps 60% in '56. E. A. Wilson (charts) July 8 98
American G&E broadens water heater element range (N) Dec. 30..... 74
American G&E's Snyder plugs heating to IAEL, Oct. 28..... *87
Appliances—men do the shopping in appliance stores (N) July 8 84
Appliances sold by TV (N) Sept. 2.... 120
Arkansas P&L employees earn rebate for installing electric heat (N) Dec. 9 90
Australia—"Live Better Electrically Week" (N) Oct. 7 108
Boston Edison 'Light for Living' sales-demonstration area. R. B. Brown Jr., Aug. 12 ..... *112
Carolina P&L salesman replaces coal boilers with heat pumps in Raleigh, N. C. office building (N) Dec. 2.... *76
Carrier Corp. sees 4% air conditioning sales jump in '58 (N) Dec. 30..... 78
Cincinnati G&E sells adequate wiring to the builder (N) Aug. 19..... *112
Color lighting boosts auto sales. D. C. Statham, July 22 114
Commercial cooking—the 'sleeping giant' (Ed) Sept. 16..... 85
Commercial cooking: 3rd survey (report) (charts & tables) Sept. 23 ..... *81—88
Commercial Cooking 'Fiestas' up sales for Wisconsin P&L. R. F. Pflug, Sept. 23 ..... *93
Consolidated Edison Co. all-electric kitchen (N) Dec. 23..... *64
Consolidated Edison unveils all-electric apartment kitchen (N) July 29 *70
Dehumidifiers sales up (N) Aug. 12.. 114
Detroit Edison plugs electric heat at meetings (N) Oct. 21..... *70
Dishwashers—selling plans and promotions, Dec. 2 74
Do we want the water heating business? (Ed) July 29..... 43
Duke Power pins 'medallion' on new home (N) Dec. 9..... *83
Duquesne Light Co. unveils customer service center (N) Dec. 30..... 74
EEI announces awards for sales promotion (N) Dec. 16 130
EEI's Fall Range Campaign (N) July 15 94
8th annual electrical industry forecast 1957-1970. A. J. Stegeman (charts & tables) Sept. 2 91
Electric space heating 1957—report. T. R. Jordan (charts & tables) Dec. 16 ..... *95—110
FBE materials available (N) Sept. 9. 80
Fedders Quigan Corp. promotes reverse-cycle heat pumps in winter (N) Dec. 9 90
Florida Power boosts air conditioning with "Weather by Wire" (N) July 15 93
Florida Power's educational, lighting lectures (N) July 22 (N)..... *114
GE's Brundage cautions SEE utilities to get rolling with heat pumps now (N) Nov. 11 ..... *84
GE fall lighting push will feature 'family room' (N) Sept. 2..... 120
Home economist has vital appliance role, Nov. 25..... 89
Hotpoint-Swift cookery road show rolls up sales (N) Dec. 9..... 88
Housepower survey (charts) Aug. 26.*63-70
Local expenditures are going up . . . but methods, techniques are fixed Aug. 26 64
Do you sell contractors on these Housepower points? Aug. 26..... 66
These two case histories show how utilities can arouse contractor interest—Detroit Ed W. R. Milby Indiana PS Leland Holtman, Aug. 26 68
NECA's Burnett gives contractor House-power views, O. F. Burnett, Aug. 26 70
How to sell 240 electrically-heated homes. H. A. Stroud, Sept. 2.....*122
IAEL meeting runs gamut of residential sales problem. Oct. 28..... *74
Kansas G&E customers design 'pattern homes' (N) Nov. 25..... 114
Kansas G&E goes after electric heat business, Aug. 5 76
Kwhrs replace man-hrs on an all-electric farm, Oct. 7 ..... *142
"Live Better . . . Electrically" industry report (charts) Aug. 19..... 77
LBE all-electric home unveiled by Cincinnati G&E and "Living" magazine (N) Nov. 11 ..... *80
LBE—'58 target: new home market (N) Oct. 14 79
LBE makes other plans for '58, Oct. 28 *50
LBE—Mid-Central utilities beat LBE drums, Aug. 5..... *72

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

LBE—"The play's the thing" (Ed) Aug. 19 69
LBE Women's Conference will be held in Chicago, Jan. 9–11 (N) Dec. 30.. 74
Look Magazine announces awards for wiring promotion (N) Nov. 25..... 114
Lost forever to the competition—90% of new homes will be served By Brooklyn Union Gas Co. (Ed) Nov. 11 51
Luxury motel hosts its guests all-electrically. M. I. Stalheim, Dec. 16 ..... *126

Medallion Home spurs LBE plans Oct. 28 ..... *47
Medallion Home: what it means to you (Ed) Oct. 28..... 43
Miami fair features 10 kitchens (N) Dec. 9 88
NARDA survey pegs appliance dealer '57 headaches (N) July 15..... 94
National Electrical Week salute—the electrical industry — how big? (charts & table) Dec. 23..... 37
National Electrical Week 'umbrella coverage set' (N) Sept. 2..... 79
1957–1958: years of growth and stability (Ed) Sept. 2 75
1957 International Lighting Competition (N) Dec. 2 ..... *50
Ohio companies plan heat meet (N) Nov. 4 84
Omaha Public Power District 'personalized service' boosts load. Mrs. B. E. Marsh, Nov. 11..... 80
Outdoor lighting report see under **Lighting**

Portland GE offers college scholarship in contest "Electricity at Work" (N) Dec. 9 71
Power-up/—your chance for an industrial load bonus, Dec. 2..... *48
Public Service E&G Co. N. J. plans resistance heating show (N) Oct. 7 144
Radio plugs Housepower; contest will spark '58 promotion, Oct. 21..... 66
Rochester G&E wins NEMA window display contest (N) Sept. 2..... *120
SEE sales meeting urges dedication to electric living, Nov. 25..... *91
Sales research in the age of precision (Ed) Nov. 18 71
School heat ABC's eyed by utilities (N) Nov. 18..... 100
Southern California Edison kicks off dryer campaign (N) Dec. 9..... 88
Southwest utilities meet to promote electric heat (N) July 22..... 123
Southwestern Public Service Co. utility office doubles as a showcase Nov. 18 ..... *98
Tampa Electric's panel helps sell heat pumps. G. D. Leach Jr., Oct. 14....*108
Union Electric scatters Christmas "snowflakes" (N) Dec. 16..... *130
Utilities turn to promotional rates that compete, Dec. 16..... 84
Utility sales outlook pegged at Middle West Service Co. conference, Nov. 4 82
Washington University backs electric heat meet (N) Sept. 9..... 82
Washington Water Power's heat rush paying off (N) Dec. 9..... 90
Washington Water Power offers heat water now,, pay later (N) Aug. 26 80
Water heaters—top ten models chosen (N) Sept. 30 49
Water heating: simplify it to sell it (Ed) I Aug. 16—69, II Sept. 9—43, III Sept. 30 47
We need an all electric committee (Ed) Oct. 28..... 43
Western Massachusetts Electric Co. special rate for the promotion of electric heating (N) Nov. 25..... 82

Solar Energy

The sun has a place in our power future (Ed) July 29..... 43
What's the future of solar energy? Theodore Baumeister, July 29..... 62
"Standard Handbook" for Electrical Engineers" a guide to today's electrical art, Dec. 2..... *57

Standardization

Experience backs bushing standards A. W. Hill July 22..... 86
IT&T opens Standards Laboratory (N) Aug. 19 136
NEMA transformer standard—lower sound level is target (N) Dec. 2.. 94
ments? Sept. 23..... 102
Tomorrow's need more standardization today (Ed) Sept. 16..... 85

Statistics

8th annual electrical industry forecast 1957–1970. A. J. Stegeman (charts & tables) Sept. 2..... 91
Electrical manufacturing increases 60% in Canada (N) July 15..... 127
'57 winter peak may take growth leap, beating summer's gain (charts) Dec. 9..... 66
1957–1958: years of growth and stability (Ed) Sept. 2..... 75
1957 summer peak loads top 1956 total by 7% (N) (table) Sept 23.... 66
Shipments and orders for electrical equipment, 1956–1960 (table) Sept. 9 114
Shipments, orders and open manufacturing capacity for electrical equipment, 1956–1960 (table) Dec. 9 103
10th steam station cost survey. J. J. Kearney (charts & tables) Oct. 7.. 115
U. S. leads world power picture (N) Sept. 16 96

Steam Stations (see also **Capacity Additions**)

American G&E tops in most efficient plants (N) Oct. 7.....*100
Appalachian Electric Power choses Ohio River as site for proposed station (N) Oct. 21 46
Arkansas P&L Harvey Couch blast laid to steam pipe (N) Nov. 25.... 85
Australia is planning three power stations (N) Sept. 2..168, Sept. 23.... 94
Boston Edison's Mystic River station stator delivered by GE by land and sea (N) July 15 .....*124
Central Illinois Public Service to expand Meredosia station (N) July 1. 95
Commonwealth Edison's 275-Mw unit has low heat rate. Schmidt & Gregory, Oct. 21 ..... *50
Commonwealth Edison's Will County station installs condenser (N) Aug. 12 .....*135
Connecticut L&P plan for steam plant on Manresa Island moves one step nearer reality (N) July 15..... 62
Cost and performance data of 44 modern steam stations. J. J. Kearney (tables) Oct. 7..... 122
First Central Station's Pearl Street 'Miracle' passes its 75th year (N) Sept. 9 ..... *50
Large C. H. Wheeler condenser shipped to Consolidated Edison's Astoria station (N) Sept. 23.....*125
Load-frequency control runs Niagara stations, Oct. 7.....*174
Memphis plant and across U. S. the pace steps up (N) Dec. 2..... *52
Ohio Power Co.'s Muskingum River Plant rolls new unit (N) Dec. 9.... *71
Southwestern Public Service Cunningham Station uses design confirmed by experience. E. W. Robinson, Oct. 14 ..... *83
Sporn Plant finds cooler backwashing method is saver. J. H. Grimes, July 8 ..... *89
10th steam station cost survey. J. J. Kearney (charts & tables) Oct 7.... 115
They're drilling for steam in New Zealand to power a 250-Mw plant, Sept. 9 ..... *60
Toledo Edison's Bay Shore station transfer scheme simple, flexible. L. E. Smith, July 8..... *80
Why energy costs differ (Ed) Oct. 14 73
Yuma, Ariz. plant will be owned jointly by Arizona P.S. and California Electric Power (N) Oct. 21.. 46

Storms

But neither snow nor sleet . . . (N) Dec. 9 71
National Conference on Applied Meteorology (N) Nov. 11 ..... *52
They're working toward accurate hurricane forecasts (N) Sept. 2..... *76
Utah P&L "brainstorms" help prepare for snowstorms (N) Nov. 18..... *78
Utilities snap back after Hurricane Audrey (N) July 15..... *58

Substations

Aluminum structure sub-station installed at Kaiser plant (N) Aug. 26.. *84
Community Public Service of Ft. Worth, Tex. reports outage caused by 5-ft water moccasin (N) July 15 62
Control LTC's to operate in parallel. W. C. Sealey, Sept 9..... *64
Corona shields prevent radio interference on 138-kv bus. A. A. Milusich, Aug. 5 ..... *70
Dry chemical passes test of transformer fires. E. F. Weaver, Aug. 26. *60
Experience backs bushing standards. A. W. Hill, July 22 86
Lightning protection has 4 determinants. T. J. Bliss (charts) Oct. 14. *90
Measure quality of transformers. A. N. Garin (charts & tables) Aug. 26.... 55
Power transformer loading practice needs a review! (Ed) Dec. 16..... 83
Power transformer operating practice —report. Dan Braymer (charts & tables) Dec. 23..... 42
Prefabricated weld fittings join aluminum bus at new Utah P&L substation. R. A. Radford, Aug. 19.... *86
Seattle City Light's Bothell substation—capacitors on 115-kv bus cost less. Skone & Moody, July 1..... *66
Selector switches bus mounted at Duke Power Co.'s Allen Plant. J. Q. Wray Jr. Sept. 30..... *57
Structures cut substation cost. J. D. Shaw, Dec. 23 ..... *51
Substation grounding practices recommended. C. P. Zimmerman, Aug. 19 *97
Vaccum-tube interrupters raise capability of disconnects Union Electric tests show. R. W. Katterhenry, Aug. 19 ..... *92
Vacuum units switch capacitors. J. W. Rittenhouse, Aug. 26 ..... *59
Washington Water Power 'simplifies' its substations (N) July 22 ..... *73
Windsor (Ont.) Utilities Comm. substations match surroundings, Nov. 4 ..... *70

Switches and Switching

Carolina P&L controls 23-kv capacitor banks economically. Burch Wayne, Oct. 14 .....*100
Delta-Star Mk-40 switch expanded to 380 kv (N) Sept. 30..... 104
Fast grounding initiates remote tripping of transformer's circuit breakers, Oct. 21..... *56
Gas cylinder is used in cutout to break load. Charewicz & Koch. Aug. 26 ..... *74
I-T-E to market new line of switchgear (N) Nov. 18 122
Pennsylvania P&L uses high-speed ground switch. Upton & Holtz, Oct. 21 ..... *56
S&C Electric produces disconnect used with loadbreak tool (N) Sept. 23.... 125
Selector switches bus mounted at Duke Power Co.'s Allen Plant. J. Q. Wray Jr., Sept. 30 ..... *57
Transfers current at hinge end of switch, Oct. 14 ..... *97
Vacuum-tube interrupters raise capability of disconnects Union Electric tests show. R. W. Katterhenry, Aug. 19 ..... *92
Vacuum units switch capacitors. J. W. Rittenhouse, Aug. 26 ..... *59

System Engineering

Are summer capacity reserves too low? (Ed) Aug. 5..... 41
Automatic controls aid area loading at Northern States Power Co. E. C. Glass (map) July 8..... *74
Computer supplants analyzer on BPA system, July 15..... 68
Connecticut's joint capacity planning: how it works and what it can do for you, Dec. 2..... *58
Cooperative computer centers have many merits (Ed) Dec. 9..... 63
Dayatron automizes turbine-generator information (N) Sept. 23..... 126
Digital computer takes over load flow calculations at American G&E. H. P. St. Clair & others (map) Sept. 30 ..... *60
Don't squeeze out the safety factor in transient stability studies. W. H. Ferguson (charts) Aug. 12..... 85
Duquesne Light Co.'s new dispatch center ups efficiency. W. C. Bryson, July 1 ..... *58
EEI report views systems planning trends (charts & tables) July 15.. 75
'Early Bird' loading computer doubles estimated yearly saving of the Southern Co. Nov. 25..... *88
Electronic computers — versatile giants (N) Nov. 25 85
Fuel cost cut by linear programming of generation, Nov. 4 66
Gompertz curves aid utility growth predictions. Krieg & Leonard Jr. (charts) Sept. 9..... 56
How Consolidated Edison drops load (N) Aug. 12 ..... *72
How much reserve do you have? K. M. Smith (charts) Sept. 9..... 55
How to minimize system stability. D. B. Brandt & others (charts) July 22 82
IBM auto-point computer and time punch unveiled (N) Sept. 30..... 106
Kansas P&L's Lawrence division cuts billing errors by data processing machine (N) Aug. 12..... *76
Ontario analyzer data, July 15..... 70
Pacific P&L receives "brain core" of Datatron computing system (N) July 15..... 62
Plan 5 years ahead for system var supply. Farmer & Whitlow, Nov. 11 ..... *68
Study effect of area interconnections. L. K. Kirchmayer & others (charts) Sept. 2..... 84
System planners advised on getting most from computer (N) Dec. 16.. 91
Ten big decisions for 1955—report 8. Will service quality measure up to demands of automation and electrical living? Dec. 30 ..... *58
Today's obligation for tomorrow's needs (Ed) Oct. 7..... 99
Toledo Edison's Bay Shore station transfer scheme simple, flexible. L. E. Smith, July 8 ..... *80

T

Taxes

American G&E's Cook defends amortization program (N) Oct. 7..... 106
Depreciation to actually replace property (Ed) Oct. 28..... 43

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Fast writeoffs—shotgun or boomerang (Ed) July 22 71
Rapid amortization finale (N) Aug. 19 76
Rule changes on liberalized depreciation debated at FPC hearing (N) Sept. 23 71
Rule changes on liberalized depreciation utilities ask: why change rules? (N) Sept. 30 ..... *52
Ten big decisions for 1958—report 8. Should we risk using liberalized depreciation or take the safe course? Dec. 30 62
What next for liberalized depreciation? (N) Aug. 26 48
Why the hassle over fast tax writeoffs? July 1 ..... *47

Television

Du Mont eyes ITV field (N) Aug. 5.. 106

Tennessee Valley Authority

Citizens push self-financing (N) Nov. 25 85
Fiscal finals (N) Aug. 12 79
Growth in the Valley (N) Dec. 30.... 54
Jones, Arnold R. appointment draws Democratic fire (N) July 29 ..... *49
Jones, Arnold R.: Ike's choice for TVA (N) July 15 ..... *59
Jones, Arnold R. sworn in as director (N) Oct. 7 108
Keeping up with Jones (N) Sept. 9.. 51
Maximum continuity gained by load control. Karr & Almon Jr. Nov. 18.. *84
Revenues climb (N) Oct. 28 53
"Stop attacking TVA" (N) July 8.... 68
TVA outlook: era of stormy transition (map) (N) Aug. 19 ..... *70
TVA test: boost pine growth with light (N) Sept. 9 ..... *80
TVA titan in '58: carte blanche or controls? (N) Dec. 30 48
Vital TVA post awaits Senate vote—Arnold Jones, center of a Congressional controversy (N) Sept. 2..... *80
Welch, Dr. Frank J. picked for TVA post (N) Nov. 18 ..... *72

Terminology

Defining terms—"public power" (N) Nov. 18 79

Testing and Tests

AMCA sets up program on fan tests, performance (N) Oct. 21 94
Boston Edison test board speeds routine relay tests. W. C. Ellis, Oct. 28 ..... *64
Build compact a.c. tester. F. M. Chittenden, July 29 ..... *73
Canned motor pump works well Virginia Electric & Power finds. J. R. Slack, Dec. 9 ..... *78
Containment vessel can be reduced Kolflat & Chittenden (charts & tables) July 29 ..... *53
EHV study photos help relate tower height to flashover rate. Burke & Hagerdorn, Sept. 9 ..... *62
GE completes meduim transformer lab (N) Sept. 16 ..... *150
Hot-line tools get moisture register test. Brust & Campbell, Sept. 16.... 116
Houston L&P special setup tests tong test ammeter, Sept. 2 116
Kaiser Steel pipe tested under pressurized gas (N) July 15..... *126
New cable testing unit installed at Rome Cable (N) Nov. 25..... 141
New meter testing unit weighs less. F. R. Keller, Dec. 23..... *62
Ohio Brass assures capacitor electrical tests (N) Sept. 9..... 118
Ohio Brass develops test for hot sticks for EHV work. D. C. Hubbard (tables) Nov. 25..... *105
Okonite centralizes testing (N) Aug. 26 ..... *94
Pole line hardware corrosion test (N) Aug. 12 135
Temporary test meters installed quickly. J.J. Wolkan, Nov. 11 ... *75
Test laminates for fire hazard use (N) Sept. 9 ..... *116
Tests bushing porcelain for pin holes. George Shombert Jr., Aug. 12....*104
Vepco sampling technique cuts meter testing cost. W. C. Harrison, July 15 ..... *72

Transformers

Atmoseal system has new features. W. J. Degnan & others, Sept. 9..... *59
Brown Boveri ships tranaformer for St. Lawrence Power Project (N) Aug. 12 ..... *138
Detroit Edison gets 360 Mva transformer (N) Aug. 5 ..... *106
Dry chemical passes test of transformer fires. E. F. Weaver, Aug. 26 *60
Fast grounding initiates remote tripping of transformer's circuit breakers, Oct 21 ..... *56
Gas-filled transformers vie with oil-filled (N) Dec. 9 72
GE completes medium transformer lab (N) Sept. 16 ..... *150
GE's LTC mechanism built on bushing (N) Aug. 19 ..... *134
GE price cut (N) Dec. 16..... 89
Lower sound level is target of NEMA standard (N) Dec. 2 94
Measure quality of transformers. A. N. Garin (charts & tables) Aug. 26.... 55
Models used to sell transformers (N) Sept. 2 ..... *166
PD transformers outlined in new 40-page book (N) Nov. 18 122
Power transformer loading practice needs a review! (Ed) Dec. 16..... 83
Power transformer operating practice —report. Dan Braymer (charts & table) Dec. 23 42
Pre-fab cells house transformers (charts) Aug. 12 90
Sangamo increases prices on transformers (N) July 1..... 98
Smaller current transformers match breaker ratings. A. Conongla (charts) Aug. 5..... 60
Stop conservator transformer oil leaks B. E. Ellsworth, Sept. 23 ..... *91
Toledo Edison's new transformer records save clerical time. George Roberts, July 22 ..... *112
Transformer makers see noise levels going down (N) July 1 44
Transformer protection: program started by "Automatic" Sprinkler Corp. of America (N) July 1 ..... *98
Vapor-cooled transformer placed in service at Consolidated Edison of N. Y. (N) Oct. 21 ..... *91
Westinghouse ships by three-part railroad car (N) Aug. 19 136
Westinghouse shows how to haul a giant, Dec. 23 ..... *41

Transmission

AIEE Fall General Meeting—lightning sparks transmission session (N) Nov. 4..... *65
American G&E field-tests new tower and twin-bundled conductors at 345 kv. E. S. Zobel, Dec. 9..... *76
Appalachian strings line on towers with live 345 kv. W. P. Carter, Aug. 19..... *84
Audio tone protects 220-kv link for Martins Creek-Siegfried line. Oewel & Burleson (map) Dec. 23 ..... *47
Canada—power restored at Kitimat (N) Dec. 23..... 36
Columbus & Southern Ohio Electric scheme transfers aerial line survey to ground. W. A. Horton, July 29.. *63
Connecticut's joint capacity planning: how it works and what it can do for you. Dec. 2..... *58
Connecticut's joint use of transmission facilities meets success (charts) Nov. 18..... 80
Costs favor dc over ac bulk transmission, July 15..... 67
Dayton P&L crossarm braces adjustable for length, July 22..... *110
Demand curves aid T&D design. R. E. Sinclair (charts) Oct. 14..... 83
Design problem: how to maintain tower clearances at low temperature. H. B. White, Dec. 9..... *73
EEI report views systems planning trends (charts & tables) July 15.. 75
EHV study photos help relate tower height to flashover rate. Burke & Hagerdorn, Sept. 9..... *62
8th annual electrical industry forecast 1957-1970. A. J. Stegeman (charts & tables) Sept. 2..... 91
Germany—380-kv grid energized (N) Nov. 4..... 64
Helicopter patrols transmission lines effectively, economically for Philadelphia Electric Co. J. M. Van Name, July 8..... *82
Horizontal borer saves on duct bank costs at Consolidated Edison, Sept. 16 ..... *104
Idaho Power technique shoots five holes per crew-day in solid rock. W. G. Bartl, July 8..... *90
Iowa companies map growth in 'survival' plan to save $140 million (map) Oct. 28..... 44
Is Russia ahead in dc transmission? (Ed) Sept. 30..... 47
New Zealand's Cook Strait submarine link to be 250-kv dc (map) Aug. 12 *83
Northern States Power Co. arrester failure blacks out Twin Cities (N) Nov. 11..... 55
PEA Assn. hears utilities will spend most on transmission and distribution (N) Dec. 2..... 56
Philadelphia Electric joins 69-kv pipe-type to oil-filled cable. R. H. Bolling, Nov. 11..... *61
Public Service Electric & Gas pipe cable gains extra Mva. J. A. Pulsford, July 1..... *60
Russian transmission features EHV and dc. J. H. M. Sykes, Sept. 30:... *62
Southern California Edison helicopter starts a 2-ton shuttle to clear rugged terrain (N) Oct. 21..... *43
Test developed for hot sticks for EHV work. D. C. Hubbard (tables) Nov. 25 ..... *105
Transmission work to set fast pace (N) (chart) Oct. 7..... *103
Union Electric tests show vacuum-tube interrupters raise capability of disconnects. R. W. Katerhenry, Aug. 19 ..... *92
Union Electric tries deionisers (N) Aug. 12..... *78
Vermont Electric Power sets first pole of 5,000 which will carry power from St. Lawrence Project (N) Aug. 5.. *44
Woodpeckers—utilities try chemical tactics to squelch destructive birds (chart) Aug. 5..... *48

Trucks and Trailers (see also Materials Handling)

Highway Trailer helps develop earth borer (N) July 8..... 127
Mount ladder on hydraulic truck derrick. W. R. Bickel, Sept. 23..... *94
Public Service Co. of Colorado underground truck works narrow alleys, Dec. 16..... 120
Snow-mud tires cut operating costs at Toledo Edison. J. L. Peck, Dec. 30.. 69
Special trailer facilitates moving digger for Kansas P&L. R. S. Hunter, Sept. 16..... *114
Toledo Edison's special truck cuts auto service costs. J. L. Peck, July 15 ..... *83
Truck speeds wire dispensing at Detroit Edison. R. H. Gabrile, July 22.*112
Two-cab vehicle carries transformers (N) Nov. 4..... *106
Ward LaFrance produces utility truck bodies (N) Oct. 14..... 141

Turbines

Allis-Chalmers designs turbine turning gear (N) July 8..... 125
Allis-Chalmers receives order for 340-Mw unit for Consolidated Edison's Astoria station (N) July 29..... 85
Allis-Chalmers ships parts of 300-Mw turbine-generator unit for Detroit Edison's River Rouge plant (N) July 22..... *144
A-C & S. M. get nod for 12 Niagara turbines (N) Oct. 28..... 108
Commonwealth Edison's 275-Mw unit has low heat rate. Schmidt & Gregory, Oct. 21..... *50
GE axial exhaust improves turbine efficiency (N) Sept. 30..... *104
Jig speeds turbine grinding jobs, Oct. 28 ..... *66
New design makes turbines compact (N) Dec. 9..... *112
Pennsylvania P&L awards $12 million contract to Westinghouse for turbine generator and related equipment (N) Sept. 30..... 106
Pump-turbine applications are many, July 22..... *107
Smith, S. M. ships second runner to Chief Joseph Dam (N) Oct. 7..... 137
Why did generator rotors burst? Expert gives the answers. A. W. Rankin, Dec. 2..... *62

V

Voltage Regulation

Higher voltages for home appliances? (N) July 15..... 94
Ohio Edison kit aids regulator training. D. W. Talley, Sept. 16..... *95
Select higher secondary voltage (N) Sept. 30..... *48
Turbogenerator use cuts costs at Cleveland Electric Illuminating Co. Buck & Didrjksen, July 8..... *78

W

Welding

Electrode simplifies welding repairs, Sept. 23..... *91

Wiring

Cincinnati G&E sells adequate wiring to the builder (N) Aug. 19..... *112
Housepower survey (charts) Aug. 26*63-70
Local expenditures are going up... but methods, techniques are fixed, Aug. 26..... 64
Do you sell contractors on these Housepower points? Aug. 26..... 66
These two case histories show how utilities can arouse contractor interest. Detroit Ed W. R. Milby. Indiana PS, Leland Holtman, Aug. 26 68
NECA's Burnett gives contractor Housepower views. O. F. Burnett, Aug. 26..... 70
Housepower—The third man is the key man (Ed) Aug. 26..... 43
Kaiser rounds the edges on flat aluminum wire (N) Nov. 25..... 144
Kaiser to produce flattened aluminum wire (N) Sept. 23..... 126
McGraw-Hill book helps plan wiring (N) Dec. 16..... 130
National Adequate Bureau changes its name to National Wiring Bureau (N) Aug. 19..... 112
Okonite Co. dedicates new plant, July 1..... *96
Southwestern PS offers new upped wiring code. Tom Lynn, July 29.... 70
Southwire cuts list price (N) Sept. 16..... 94
Wire "multiple-itis" is hit at Wires & Cable meeting (N) Dec. 16..... 161

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

AUTHOR'S INDEX

ALBERTSON, L.: Rejects drop, output grows with novel air conditioning, Dec. 23 ..... *71
Alden, Glen J.: Cable keeps ram running, July 15 103
Circulation heater cuts acetylene gas costs, July 8 ..... *104
Converted crane ends production breaks, Aug. 26 84
Electric heater spurs laggard gas in scrap yard, Sept. 16 ..... *132
Almon, C. P. Jr. & C. L. Karr: Maximum continuity gained by load control, Nov. 18 ..... *84
Anderson, C. B.: Sectionalize 4-kv underground system safely, Aug. 12 ..... *96

BALLOTS, THOMAS: Electric pump and ingenuity clean coal, Nov. 4 86
Heat ducts boost cable quality, trim process time, Dec. 9 ..... *94
Barry, L. C.: Plastic cover fits many service joints, Aug. 5 ..... *68
Bartl, W. G.: Shoot five holes per crew-day in solid rock, July 8 ..... *90
Baumeister, Theodore: What's the future of solar energy? July 29 62
Berglund, C. W. Jr.: Kwhrs heat school in 8,200 degree-days, Sept. 16 ..... *130
Bewley, F. A.: Electric power boosts quarry production, Nov. 11 ..... *88
Bickel, W. R.: Mount ladder on hydraulic truck derrick, Sept. 23 ..... *94
Bliss, T. J.: Substation lightning protection has 4 determinants, Oct. 14 ..... *90
Blythe, J. D.: Indianapolis P&L lights parks, streets in annual program, Sept. 16 ..... *128
Bolling, R. H.: Joins 69-kv pipe-type to oil-filled cable, Nov. 11 ..... *61
Brandt, D. B. & others: How to minimize system stability problems, July 22 .. 82
Braymer, Dan: Power transformer operating practice, Dec. 23 42
Brown, D. C. & F. E. Titus: Timer halts salt loss in water softeners, Dec. 16 116
Brown, R. B. Jr. 'Light for Living' pulls customers in Boston, Aug. 12 ..... *112
Brown, R. L. & H. A. Enos. How to get more from distribution regulators, Oct. 7 110
Brust, V. W. & J. H. Campbell: Hot-line tools get moisture register test, Sept. 16 116
Bryson, W. C.: New dispatch center ups efficiency, July 1 ..... *58
Buck, K. D. & C. H. Didriksen: Turbogenerator use cuts costs, July 8 ..... *78
Buford, Leslie: Power rig raises transformers easily, Dec. 23 ..... *59
Burch, Wayne: Control 23-kv capacitor banks economically, Oct. 14 ..... *100
Burke, G. W. & Herman Hagerdorn: EHV study photos help relate tower Height to flashover rate, Sept. 9 ..... *62
Burleson, A. J. & J. A. G. Oewel: Audio tone protects 220-kv link, Dec 23 ..... *47

CAMBIAS, SEYMOUR JR.: Micarta saves as covering on aluminum leads, Dec. 9 ..... *84
Campbell, J. H. & V. W. Brust: Hot-line tools get moisture register test, Sept. 16 116
Carlton, Lowis: Electric light grows pompoms in Florida, Oct. 14 ..... *104
Carter, W. P.: Appalachian strings line on towers with live 345 kv, Aug. 19 ..... *84
Charewicz, F. J. & R. E. Koch: Gas cylinder is used in cutout to break load, Aug. 26 ..... *74
Chiodini, A. J. & B. A. Merritt: Form plywood, hardboard to tricky shapes, Oct. 14 ..... *112
Chittenden, F. Max: Build compact a.c. tester, July 29 ..... *73
Chittenden, W. A. & Alf Kolfat: Containment vessel can be reduced, July 29 ..... *53
Cogburn, C. W. & G. C. Kelley: Relays prevent system shutdowns, Nov. 4 ..... *71
Compton, Olin R.: Oil reclaiming process saves 10.5%, Nov. 18 ..... *82
Conangla, A.: Smaller current transformers match breaker ratings, Aug. 5 60
Cravens, James H.: 33-kv bushing modernization modified, Dec. 30 ..... *69

DEGNAN, W. J. & others: Atmoseal system has new features, Sept. 9.. *59
DeWeese, Fred C.: Unit values of current, kva and their vector relations of lkw, 100v, at various pf, July 15 90
Didriksen, C. H. & K. D. Buck: Turbogenerator use cuts costs, July 8 ..... *78
Dietrich, R. C.: Photos aid engineers and mangement, Oct. 21 ..... *62
Doucette, G. G. Jr. & others: Atmoseal system has new features, Sept. 9 .... *59
Duryee, L. M.: 450 kc speeds tool output, Oct. 7 ..... *146
Dy Liacco, T. E.: Standarize relay schemes and settings, Nov. 18 ..... *86
Dye, J. W. & A. Howard: Ultrasonics speed meter register cleaning, Aug. 5 ..... *56
Dzubay, P. P. & others: Now you can predict energy usage in terms of temperature, wind, sun and appliances, Dec. 16 ..... *104

ELLIS, R. G. & K. L. GRUBB: Pyrites discharge operation improved, Sept. 16 ..... *113
Ellis, Walter C.: Test board speeds routine relay tests, Oct. 28 ..... *64
Ellsworth, B. E.: Stop conservator transformer oil leaks, Sept. 23 ..... *91
Enos, H. A. & R. L. Brown: How to get more from distribution regulators, Oct. 7 110

FAIRMAN, JAMES F.: Indian Point's nuclear design revised by Consolidated Edison, Oct. 21 ..... *44
Farmer, V. J. & G. S. Whitlow: Plan 5 years ahead for system var supply, Nov. 11 ..... *63
Fay, V. C.: Bunker grating improved, Dec. 9 ..... *84
Ferguson, W. H.: Don't squeeze out the safety factor, Aug. 12 85
Fisler, Harry: Electric unit cuts steam costs, Aug. 19 116
Flaherty, J. J. & R. M. Winsborough: What makes a good manager? Sept. 9 52
Fulford, T. D. & T. L. Sharkey: Residential load study is key to the future; does your company use it? Dec. 9.. 79

GABRILE, RICHARD H.: Truck speeds wire dispensing, July 22 ..... *112
Garin, A. N.: Measure quality of transformers, Aug. 26 55
Gismond, Howard E.: Once-thru boiler used for subcritical operation, Dec. 23 ..... *52
Glass, E. C.: Automatic controls aid area loading, July 8 ..... *74
Goldberg, Yale & G. L. Walkup: How IP&L crossed R. R. with long duct, Dec. 30 ..... *66
Graham, H. M. & N. M. Neagle: How to apply 50-kvar capacitors underground successfully, Nov. 4 ..... *74
Gregory, J. J. & R. G. Schmidt: 275-Mw unit has low heat rate, Oct. 21 ..... *50
Green, Orval F.: Revised hopper doors cut labor, Dec. 9 ..... *87
Griffith, Hugh W. Jr.: 1-stator, 1-rotor unit meters 4-wire, 3-phase, Sept. 9 ..... *68
Grimes, J. H.: Cooler backwashing method is saver, July 8 ..... *89
Groome, Donald: I-R oven cracks bottleneck, Oct. 28 89
Grubb, K. L. & R. G. Ellis: Pyrites discharge operation improved, Sept. 16 ..... *113
Guess, L. T.: Determine deflections for aluminum pipe bus, July 1 72

HAGERDORN, HERMAN & G. W. BURKE: EHV study photos help relate tower height to flashover rate, Sept. 9 ..... *62
Haley, James: Dry cleaning saves control-air filters, Dec. 23 59
Hall, A. A. Jr.: Insulated open wire cuts costs, Sept. 16 ..... *101
Hally, H. G.: Take a bold look at distribution, Aug. 5 ..... *62
Handy, J. C.: Trim cost, noise, with electric fork lifts, Oct. 28 ..... *88
Harrison, W. C.: New sampling technique cuts meter testing cost, July 15 .... *72
Hartman, Norman S.: Candy output climbs as steam yields to electric heat, Dec. 23 ..... *71
Infra-red steps up shoe relasting, Dec. 16 135
Hauer, Herbert E.: Automatic regulator cuts cooling water 80%, Sept. 30.. *80
Hayes, William R.: Jig speeds valve dismantling, Nov. 25 ..... *110
Hill, A. W.: Experience backs bushing standards, July 22 86
Hiteshue, George P.: High frequency trims handling, space needs, Dec. 2 ..... *78
Holtman, Leland: Indiana PS lets them decide, Aug. 26 ..... *68
Holtz, P. & C. W. Upton: Uses high-speed ground switch, Oct. 21 ..... *66
Horton, W. A.: Transfer aerial line survey to ground, July 29 ..... *63
Howard, A. & J. W. Dye: Ultrasonics speed meter register cleaning, Aug. 5 ..... *56
Hubbard, D. C.: Develops test for hot sticks for EHV work, Nov. 25 ..... *105
Hunt, George O.: Coordinated relaying protects processing, Sept. 23 ..... *78
Hunter, Richard S.: Special trailer facilitates moving digger, Sept. 16 ..... *114
Hutchins, W. F.: Mechanized handling trims plant labor cost, Dec. 30 .... *80
Hutchinson, Paul M.: Modernization ends water shortage threat, Aug. 12 .... *116

JAMISON, G. C. & J. M. TURNBULL: Water stored off-peak can heat and cool space, Nov. 11 ..... *66
Johnson, Wayne H.: Required ground-line diameter for standing poles is estimated by this quick method, Oct. 21 54
Jones, Clyde: Boost casting quality, raise pot capacity, July 1 ..... *80
Jones, F. W.: Portable tester checks rubber gloves in field, Dec. 9 ..... *86
Jordan, T. R.: Electric space heating 1957, Dec. 16 95

KARR, C. L. & C. P. ALMON, JR.: Maximum continuity gained by load control, Nov. 18 ..... *84
Kaspar, Arthur: Powers plant pumping station, Oct. 21 ..... *49
Katterhenry, R. W.: Raise capability of disconnects, Aug. 19 ..... *92
Kearney, John J.: 10th steam station cost survey, Oct. 7 115
Keller, F. R.: New meter testing unit weighs less, Dec. 23 ..... *62
Kelley, G. C. & C. W. Cogburn: Relays prevent system shutdowns, Nov. 4 ..... *71
Kimball, Paul: New lighting puts an end to production delays, Dec. 16 ..... *135
Kirchmayer, L. K. & others: Study effect of area interconnections, Sept. 2 84
Kline, F. L.: Pole-type vehicle shed cuts building costs, Aug. 26 ..... *76
Koch, R. E. & F. J. Charewicz: Gas cylinder is used in cutout to break load, Aug. 26 ..... *74

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

Kolflat, Alf & W. A. Chittenden: Containment vessel can be reduced, July 29 ..... *53
Krieg, E. H. & H. C. Leonard Jr.: Gompertz curves aid utility growth predictions, Sept. 9 56

LEACH, GILBERT D. JR.: Panel helps sell heat pumps, Oct. 14 ..... *108
Lease, R. S.: Gauges studded boiler tube erosion, Oct. 7 ..... *135
Leonard, H. C. Jr. & E. H. Krieg: Gompertz curves aid utility growth predictions, Sept. 9 56
Lewis, H. S.: Two phases can supply 4-wire 120/208 v, Nov. 18 ..... *95
Lloyd, B. L.: Hazards dictate generator relays, Sept. 16 ..... *97
Industrial supply poses problems, Nov. 11 ..... *63
Loane, E. S.: Pumped-storage hydro attractive, Sept. 23 ..... *73
Lynch, Roy M.: Turning preserves ash-removal piping, July 8 90
Lynn, Tom: SPS offers new upped wiring code, July 29 70

MAIER, GEORGE H.: Heat precision machine shop electrically, Sept. 2 ..... *124
Marsh, Mrs. B. E.: "Personalized service" boosts OPPD load, Nov. 11 80
Marshall, H. G.: Automatic controls put spinning reserve on line in 9½ seconds, Aug. 26 52
McBurney, E. B.: Single-phase service costs less, Oct. 28 54
McCammon, P. F. & J. D. Richey: Red-end hose shows peril, Sept. 9 ..... *68
McGinnis, J. N. Jr.: Coil presses designed to speed motor repairs, July 1 70
McLellan, J. A.: 2,300-v radial economic for motors, July 1 ..... *51
Meagher, J. F.: Aerial cable network in business area looks to ultimate underground, Aug. 12 ..... *98
Mellor, A. & others: Study effect of area interconnections, Sept. 2 84
Merritt, B. A. & A. J. Chiodini: Form plywood, hardboard to tricky shapes, Oct. 14 ..... *112
Milby, W. R.: Detroit Ed teaches to "sell up", Aug. 26 ..... *68
Millar, Charles C.: Air conditioning key to accurate machining, July 8 ..... *104
Immersion units make mill fat flow faster, Aug. 26 84
Milusich, A. A.: Corona shields prevent radio interference on 138-kv bus, Aug. 5 ..... *70
Montiegel, Bart: Dumps condensate, boosts unit output, Sept. 30 74
Moody, A. W. & R. L. Skone: Capacitors on 115-kv bus cost less, July 1 ..... *66
Moore, Harry F.: Raise output, improve mill operation, July 15 ..... *103
Mueller, John: West Penn writes down its policy—here's how it tackled the job, Nov. 4 62

NEAGLE, N. M. & H. M. GRAHAM: How to apply 50-kvar capacitors underground successfully, Nov. 4.. *74
Newmeyer, W. L. & H. S. Riesbol: Western drought relaxes tight grip, July 29.. *50
Nold, Henry G.: Saves on meter handling, July 29 ..... *66

OBERHOLZER, CLYDE: Purchased power speeds delivery, trims mill costs, July 22 124
Oewel, J. A. G. & A. J. Burleson: Audio tone protects 220-kv link, Dec. 23 ..... *47
Olmsted, L. M.: Trends in underground distribution, Aug. 12 ..... *87
Ormstron, A. J.: Steel roof decking cuts concrete floor costs, Sept. 9 72
Osborn, J. B.: Cast iron pipe repairs simplified, Nov. 11 ..... *76

PARKER, JAMES E.: Modernization clips brewery production costs, Nov. 4.. *86
Patton, James H.: 2-stator wye meter offers flexibility, July 15 ..... *86
Paul, Edward: Heater simplifies gasket handling, Nov. 11 88
Peak, George W.: Where does the engineer stand? 36 utilities surveyed, Oct. 14 *80
Peatfield, R. R.: Industrial relaying faces bigger job, Oct. 28 ..... *59
Pechan, Edward H.: Automation key to brewery grain handling, Nov. 18 ..... *104
Peck, J. L.: Snow-mud tires cut operating costs, Dec. 30 69
Special truck cuts auto service costs, July 15 ..... *83
Pflug, R. C.: 'Fiestas' sell commercial cooking for Wisconsin P&L, Sept. 23 *98
Pokrop, P. C.: Precision heat is key to quality product, Aug. 19 ..... *116
Porter, L. F.: Aluminum cable used for secondary mains, Aug. 12 ..... *101
Pulsford, J. A.: Pipe cable gains extra 35 Mva, July 1 ..... *60

RADFORD, RALPH A.: Prefabricated weld fittings join aluminum bus, Aug. 19 ..... *86
Rankin, A. W.: Why did generator rotors burst? Expert gives the answers, Dec. 2 ..... *62
Rankine, L. J.: Two-thirds rule used for capacitor kvar, Dec. 2 72
Richey, J. D. & P. F. McCammon: Red-end hose shows peril, Sept. 9 ..... *68
Richter, V. Craig: Dick Nixon's expanding role, Dec. 9 64
New lobbying bill seen to stir Congress fight, July 8 64
Riesbol, H. S. & W. L. Newmeyer: Western drought relaxes tight grip, July 29.. *50
Ringlee, R. J. & others: Atmoseal system has new features, Sept. 9 ..... *59
Rittenhouse, Joseph W.: Vacuum units switch capacitors: Aug. 26 ..... *59
Roberts, George: New transformer records save clerical time, July 22 ..... *112
Robinson, E. W.: New plant uses design confirmed by experience, Oct. 14 .... *88
Rosebrugh, D. W. & others: Now you can predict energy usage in terms of temperature, wind, sun and appliances, Dec. 16 ..... *104
Russell, R. B.: Speeds capacitor production, Aug. 5 ..... *80

ST. CLAIR, H. P. & OTHERS: Digital computer takes over load flow calculations, Sept. 30 ..... *60
Sandell, Donald H.: Three steps lead to economical and reliable aluminum buses, Nov. 25 ..... *92
Scharp, C. B.: Coordinate generator prewarming with controlled turbine starting, Aug. 19 88
Schmidt, R. G. & J. J. Gregory: 275-Mw unit has low heat rate, Oct. 21..... *50
Schultz, N. R. & others: How to minimize system stability problems, July 22.. 82
Scully, T. W.: Electric oven cuts glass drying time by 90%, Dec. 9..... *94
Sealey, W. C.: Control LTC's to operate in parallel, Sept. 9 ..... *64
Servary, W. H.: Spurs transformer production, cuts rejects, Nov. 25 ..... *120
Sharkey, T. L. & T. D. Pulford: Residential load study is key to the future; does your company use it? Dec. 9 79
Shaw, John D.: Structures cut substation cost: Dec. 23 ..... *51
Shay, Cecil E.: Causes of boiler-tube leakage traced, Aug. 19 98
Shelhorse, A. W.: Georgia Power prevents damage, saves space with bushing storage racks, Sept. 2 119
Steel crate protects bushings, Aug. 5.. 70
Shelton, Paul S.: 12.47 kv proves success in southern New England, July 29.. *58
Shombert, George Jr.: Tests bushing porcelain for pin holes, Aug. 12 ..... *104
Simmons, H. O. Jr. & others: How to minimize system stability problems, July 22 82
Study effect of area interconnections, Sept. 2 84
Sinclair, R. E.: Demand curves aid T&D design, Oct. 14 83
Skone, R. L. & A. W. Moody: Capacitors on 115-kv bus cost less, July 1..... *66
Skuk, Stanley: Garden lighting grows among Hawaiian palms, July 22... *92
Slack, J. R.: Canned motor pump works well, Dec. 9 ..... *78
Smith, J. C. & R. E. Smith: Buried-cable residential distribution proves success, Aug. 12 ..... *92
Smith, K. M.: How much reserve do you have? Sept. 9 55
Smith, Leroy E.: Transfer scheme simple, flexible, July 8 ..... *80
Smith, R. E. & J. C. Smith: Buried-cable residential distribution proves success, Aug. 12. ..... *92
Smith, R. C.: High frequency speeds up heat treating, July 22 ..... *124
Snyder, R. G.: High frequency saves 75%, Sept. 16 ..... *132
Soule, George A.: Boosts output and quality in crowded plant, July 29..... *74
Spencer, R. L.: Kwhrs heat lumber office, Dec. 23 ..... *68
Springer, H. E.: Industrial safety must be planned carefully, Dec. 16..... *92
Stagg, G. W. & others: Digital computer takes over load flow calculations, Sept. 30 ..... *60
Stalheim, M. L.: Luxury motel hosts its guests all electrically, Dec. 16..... *126
Statham, Donald C.: Color lighting boosts auto sales, July 22 114
Stegeman, Arthur J.: 8th annual electrical industry forecast 1957–1970, Sept. 2 91
Steinhauser, Ruth Phillips: Thrift plan supplements pension, July 8..... 71
Stevens, R. H.: Look to aerial cable and vaults for serving small business areas, Nov. 25 96
Stone, Harold: Grounded-Y better for capacitors, Sept. 2 90
Stroud, H. A.: How to sell 240 electrically-heated homes, Sept 2..... *122
Swarts, Ralph C.: Use 'rouse-power' to win over your utility customers, July 22 ..... *75
Sweetland, L. L.: Lighting lifts crane output, Sept. 9 ..... *89
Sykes, J. H. M.: Fast breeder nears completion, Sept. 16..... *106
Sykes, J. H. M.: Russian transmission features EHV and dc, Sept. 30..... *62

TALLEY, DWIGHT M.: Kit aids regulator training, Sept. 16 ..... *95
Tarbell, J. H.: Press cures glue faster, Aug. 5 ..... *89
Thomas, J. B. C.: How to compute a room's heating needs in 3 minutes, Dec. 16 108
Thomas, J. B. C & others: Now you can predict energy usage in terms of temperature, wind, sun and appliances, Dec. 16 ..... *104
Thompson, James R.: Demonstrating the live line hazard, Oct. 7..... *109
Titus, F. E. & D. C. Brown: Timer halts salt loss in water softeners, Dec. 16. 115
Tscherne, Maria & others: Digital computer takes over load flow calculations, Sept. 30 ..... *60
Turnbull, J. M. & G. C. Jamison: water stored off-peak can heat and cool space, Nov. 11 ..... *66

UPTON, C. W. & P. HOLTZ: Uses high-speed ground switch, Oct. 21..... *56

VAN NAME, J. M.: Helicopter patrols transmission lines effectively, economically, July 8..... *82
Van Sleen, Robert: Card-size units aid training of linemen, Sept. 2..... *54

WADE, H. M.: Tying and untying 13.2 kv made safer and faster, Aug. 19.. *108
Wagner, C. H.: Temporary service setup specified to save on costs, Sept. 30.. *70
Wagner, George C.: Hot wire cuts curves in foam, Sept. 9 89
Novel oven bonds plastic to wood panel, Sept. 23 ..... *106
Plant finds heater for every application, Aug. 26 ..... *84
Walkup, G. F. & Yale Goldberg: How IP&L crossed R. R. with long duct, Dec. 30 ..... *66
Weaver, Earle F.: Dry chemical passes test of transformer fires, Aug 26... *60
Weaver, H. B.: Insulator stack rates for 138 kv, Nov. 18 ..... *90
Webb, P. C.: Automatic handling cuts labor at cement block plant, Sept. 23 ..... *106
White, H. B.: Design problem: how to maintain tower clearances at low temperature, Dec. 9 ..... *73
White, H. M.: Engineered lighting boosts efficiency, Oct. 7 ..... *146
White, James B.: How heat pumps helped spur area development, Sept. 30.... *78
Whitlow, G. S. & V. J. Farmer: Plan 5 years ahead for system var supply, Nov. 11 ..... *68
Williamson, F. A.: Man-lift speeds construction men to job, Nov. 18 95
Willison, R. E.: Silicon good for high-voltage rectifiers, Nov. 4..... *78
Wilson, E. A.: APCO jumps heat pumps 60% in '56, July 8..... 98
Wing, Curtis C.: Scale model speeds job instruction, Sept. 2..... 114
Winsborough, R. M. & J. J. Flaherty: What makes a good manager? Sept. 9 52
Wolkan, Joseph J.: Temporary test meters installed quickly, Nov. 11..... *75
Woodson, R. K.: Air-driven auger cuts manhours 60%, Oct 7 ..... *135
Mechanize pavement breaking operations, Sept. 2..... *112
Wray, J. Q. Jr.: Selector switches bus mounted, Sept. 30 ..... *57

ZIMMERMAN, C. P.: Store bushings in switching structures, Dec. 16..... *115
Substation grounding practices recommended, Aug. 19 ..... *97
Zink, Irma A.: Library should serve all, July 1 ..... *45
Zobel, E. S.: AG&E field-tests new tower and twin-bundled conductors at 345 kv, Dec. 9..... *76

(Ed) Editorial. *Illustrated. (N) News. (R) Reference Sheet.

90% open spacer in new Exide-Manchex gives you more power, sustains it longer

Now even better. New-design Exide-Manchex Batteries feature (1) suspended plates; (2) high level electrolyte; (3) large sediment reservoir — dependable power for added years of use.

In between the plates of every new Exide-Manchex Battery there's an extra-thick layer of power-sustaining electrolyte that other plante-type batteries don't have. When the positive plate needs acid to meet a sustained load, the Exide-Manchex can supply it—quickly and in ample amount to produce the needed power at a higher end voltage.

This is only one of the practical ways you benefit from the new 90% open spacer now used in new Exide-Manchex Batteries. In addition, ions are freer to travel back and forth between the plates—during both normal and high current conditions. The greater open area reduces the battery's internal resistance. Hence it holds its voltage longer under high load. It is less subject to internal heating. And its life potential is significantly prolonged.

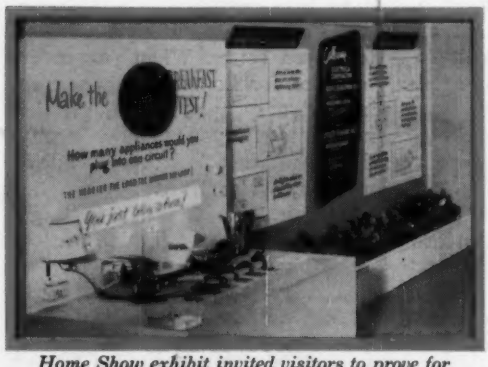
With this new design, Exide engineers have succeeded in making the world's most famous long-life battery even better. When you order batteries for float or cycle service in stationary applications, get the most value for your money. Specify Exide-Manchex. For detailed information, write Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

Exide®

Utility representatives, many with no previous wiring experience, spend several months working with electrical contractors to learn estimating. BG&E also offers the "HOUSEPOWER FORUM," a special sales training course for contractors.

Over 4,000 HOUSEPOWER T.M. jobs in first full year sparked by Baltimore Gas & Electric's aggressive sales program

Trained salesman makes wiring survey, points out to customers how low HOUSEPOWER keeps their present electric appliances from functioning properly, and prohibits use of additional appliances.



Home Show exhibit invited visitors to prove for themselves how adding appliances will blow a fuse, demonstrating need for adequate wiring.

When Baltimore Gas and Electric Company decided, early in 1956, to *prove* to electrical contractors that rewiring for full HOUSEPOWER could be big business, the results electrified both the utility and the cooperating contractors.

The utility, with the assistance of cooperating contractors, trained four representatives to conduct free wiring surveys and to give a firm estimate to have the job done. Meanwhile, a powerful advertising and promotional program urged customers to request a *free* HOUSEPOWER survey.

Housepower jobs which develop from these free surveys are turned over to cooperating contractors on a rotating basis, unless the customer specifies a certain contractor. Contractors are encouraged to use the utility's Wire-On-Time plan, which allows rewiring costs up to $300.00 to be added to the monthly electric bill, with up to 36 months to repay. The utility credits much of the success of its program to this convenient time payment plan.

Over 33 % of BG&E's free surveys result in HOUSEPOWER jobs; public acceptance of the survey plan has made it necessary for the utility to double its staff; direct HOUSEPOWER sales by contractors have multiplied, due to active promotion. Result: Over 4,000 HOUSEPOWER sales for the area during 1957.

"Outstanding HOUSEPOWER programs such as this show how the virtually untapped rewiring market can mean big business for the whole electrical industry," says H. E. Greenwalt, Kuhlman Electric Company executive vice-president and general manager.

Published in the interest of the electrical industry by

KUHLMAN ELECTRIC COMPANY
Birmingham, Michigan

MANUFACTURERS OF DISTRIBUTION AND POWER TRANSFORMERS